The
Electrical Review

VOL. CXIII. SEPTEMBER 8, 1933 No. 2911.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AZIZKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Principal Contents:

	PAGE
Modern Public Lighting	305
Solid Intermeshed Distribution. By P. F. Stritzl	308
Neon Sign Protection. By E. A. Beavis	309
Electric Motor Cooling. By J. F. Romer	310
The Technique of Ebonite Manufacture. By F. A. Middleton	311
A Domestic Tariff. By J. L. Ferns	312
The Public Lighting Conference	313
A New Acoustic Noise Meter	315
The British Association	316
The Orleans-Tours Electrification	317
Bakers' and Confectioners' Plant	318
Correspondence: Unprotected Service Connections; Extraction Turbines; An Alternative Severn Scheme; Neon Warning Lights; Round or Flat Pins?; What Shall I Have to Pay?	319
New Apparatus and Devices	321
Electricity Supply Costing. By H. Southall	323
Dutch Electrical Imports and Exports	324
Business and Industrial Notes	325
Electricity Supply	329
Traction	331
Communications	331
Contract Information	332
Notes	333
Our Personal Column	334
New Companies Registered	335
Returns of Electrical Companies	335
City Notes	335
Stocks and Shares	335
Published Specifications	337
New Work for Contractors	338

Modern Public Lighting

IT is no disparagement of the papers read at the Margate conference of the Association of Public Lighting Engineers, or of the other enjoyable functions, to say that the centre of interest this year was the exhibition of equipment.

The attraction was that the exhibits were "live" and included as their main feature practical demonstrations of what can be done with the latest developments in electric discharge lamps, sometimes termed hot-cathode tubes, or, less felicitously, gas-discharge lamps. The happy idea of Mr. H. V. Emptage, Margate's lighting superintendent, of giving in his paper particulars of these and other exhibits, and how to find them, was very helpful to delegates.

We have followed stage by stage the progress made by these lamps in successive installations, since the experimental units were erected at East Lane, Wembley, some fifteen months ago, and there seems to have been a steady improvement in details.

The deficiency in red light, upon which we have previously commented, appears to us to be less noticeable in the most recent examples. Possibly this may be due to some extent to our having become accustomed to the unusual colour rendering, and it is probable that the eyes of the general public will also prove adaptable to the deviation from the normal spectrum.

The development of the discharge lamp is important on both scientific and practical grounds; it provides support to those who contend that future innovations in electrical engineering depend upon physics, and it promises enormous improvement in our standard of public lighting.

And by "public lighting" we mean the floodlighting of buildings as well as street lighting; we wish, for example, that the floodlighting of Trinity Church, Margate, which is so noble a landmark, could be made permanent. This was carried out by means of gas-filled lamps, which were used elsewhere also for carrying out white floodlighting. It is in coloured floodlighting that the new lamps show to the best advantage owing to the elimination of the inefficient colour filters required with tungsten lamps.

Although the discharge lamp has been available for so short a time, we believe it to be a thoroughly practical thing, and there is no need for lighting authorities to await further developments before taking steps to improve illumination on roads where the traffic is speedy. Roughly we get two and a half times the lumen efficiency and one and a half times the life of an equivalent gasfilled lamp at about twice its cost, which is not a large sum, as well as greater road safety, due to the freedom from glare and use of abundant light in the right direction.

Margate was well chosen for the demonstration, as the public likely to be influenced is large, and there is a substantial proportion of gas lighting in its streets (gas is 7½d. per therm, and electricity 2½d. per kWh for street lighting). There will be a need, though, to educate lighting authorities when considering the installation of discharge lamps to bring illumination intensities up to candle power and not down to wattage.

Looking Forward

IN his address as president of the Engineering Section of the British Association, Mr. R. W. Allen looks back on the developments of the past fifty years, laying particular emphasis on the changes brought about by the steam turbine, the heavy-oil engine, and the centrifugal pump, all products of the period for any practical purpose, and all intimately connected with electrical progress. But Mr. Allen is not concerned with these merely as interesting reminiscences. He is obviously chiefly interested in what they will lead to in an age in which engineering development is more rapid than it has ever been. He entertains no regrets that science is replacing rule of thumb, and offers some constructive views on the training of apprentices, pointing out that observation and experiment are better than book learning only. Looking back on his experiences his considered opinion is that the

whole structure of modern civilisation rests upon the progressive application of physical science to the requirements of mankind. Mr. Allen does not subscribe to the doctrine that science is inimical to human happiness.

The Grid Completed

WHEN Mr. J. W. Beauchamp ran the final bolt into the base of a tower in the New Forest on Tuesday last, the grid system was completed. This was the last of the 26,265 towers to be erected in the £27 million scheme which has been designed to make electricity more generally available and at a lower price to the consumer. Some daily papers have once more implied that this means automatically cheap electricity on tap in every hamlet in the country. This is not so, as Mr. Beauchamp pointed out at the function that followed. The Central Electricity Board has provided the backbone for the national electrification effort; the rest will depend upon the local distributors. None should know better than he what heavy work remains to be done in securing consumers, by propaganda and after-sales service. His experience as chief of a progressive supply undertaking, as director of E.D.A. until about six years ago, and now as manager of the S.W. England and S. Wales area of the Board, has given him valuable first-hand knowledge of how much we all look to the enterprise and initiative—individual and collective—of the 660 distributing undertakings in implementing the Board's work of co-ordinating electricity supply.

A Pious Hope

IN spite of the fact that one of the leading parties in the matter—the electricity supply industry—has declined to assist in the operation of the "fair-trading policy" evolved after many years by the celebrated Committee "D," the other sections of the industry are making an endeavour to work the scheme. We report in this issue that Mr. W. H. Walton has been appointed the E.C.A. representative upon a new committee which has been set up for the purpose. In our issue of July 28th we were compelled to express our doubts whether this fair-trading policy could possibly succeed without the co-operation of the supply authorities, but Mr. W. Finlay, secretary of the E.C.A. of Scotland, is more optimistic. In a recent contribution to the Press he says (rather naïvely) that "the policy has not been formally approved by I.M.E.A. and the power companies, but as it is mainly concerned with the purely commercial or sales side of the industry as distinguished from the supply side, it is hoped that the policy will at least receive the tacit acquiescence of these important bodies." As the supply authorities maintain that they should have a say in "the purely commercial or sales side of the industry," we imagine that their attitude will hardly be tacitly acquiescent.

Power Station Risks

IT is not until one has to deal with apparatus the handling of which involves some risk that one realises how frequent are momentary aberrations on the part of even the most capable and steady of men. Official regulations are devised to prevent the incurring of undue risks through the employment of unskilled men on certain work except under direct supervision, but accidents of the kind which occurred at the new Battersea power station the other day are more difficult to avoid by such precautions as the man involved was admittedly of a most competent type. We must not, in order to guard against all possibility of risk, devise regulations that would hamper such men in the exercise of their initiative when carrying out work in dangerous places. Present practice requires visual indications of the state of switching to be centralised in the control room away from the switchgear. This need not prevent the installation of warning devices locally which would often serve as a reminder that additional caution was needed.

Supplying the Long-Hour Load

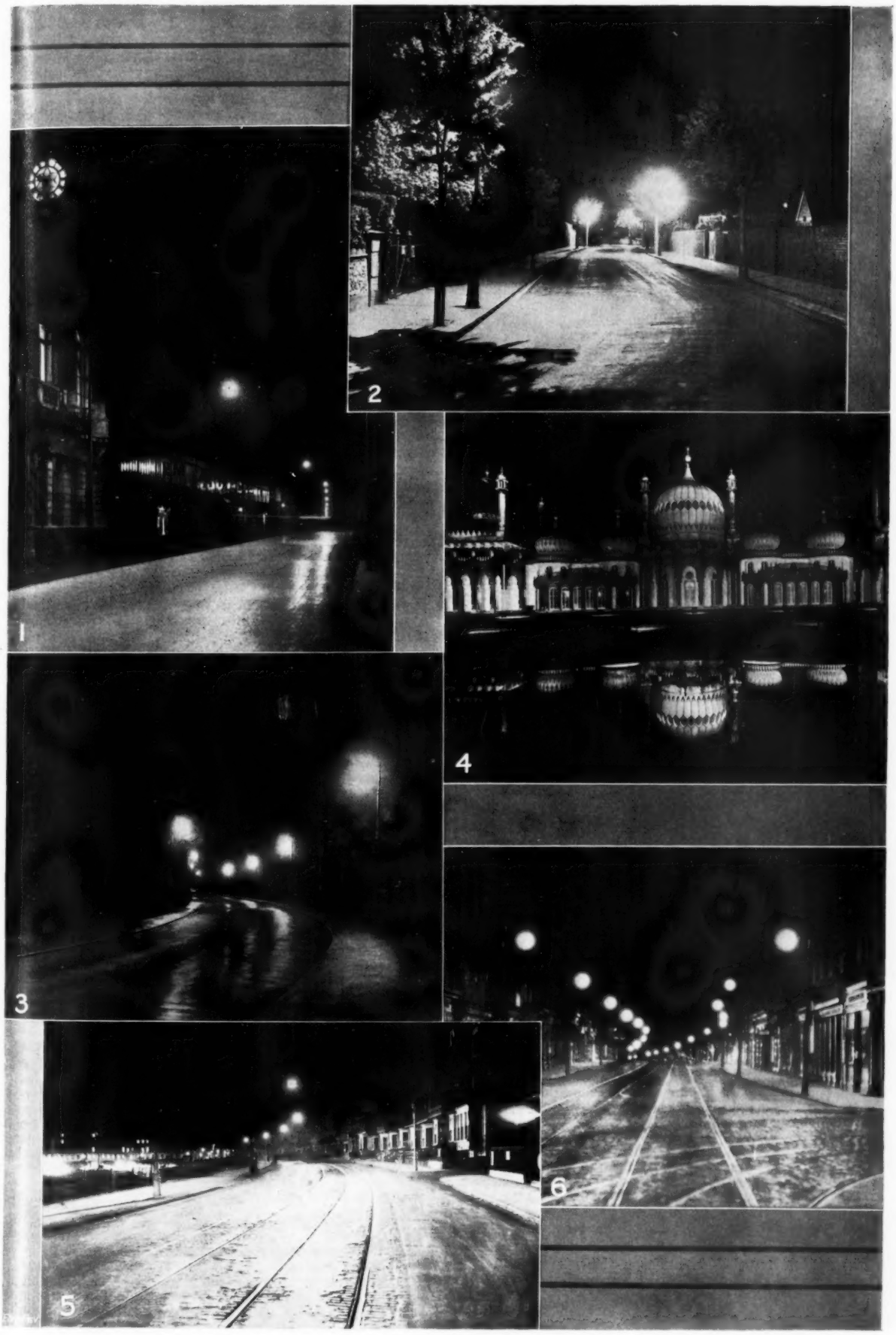
THE question of whether a steady long-hour load should be supplied from the extension of a highly efficient power station rather than from existing plant in a less economical station is comparable with that relating to the taking of a bulk supply. The standing plus running charges of the larger station must be less than the running charges alone of the local station, since the standing charges on the latter have to be met in any case. Mr. J. W. Meares asks whether the grid peak-load stations are as inefficient as the leaderette in our last issue on "An Alternative Severn Scheme" would seem to imply. The inefficiency is purely relative to the total costs, at high load factors, of electricity obtained from the grid base-load stations. For supplies taken for short periods only the existing stations are no doubt good enough, but for the excellent load factors that would be provided by the pumping plant envisaged by Mr. Meares we should expect it to be usually worth while to extend the base-load stations, the costs of production at which would (according to the Severn Barrage Committee) be materially better than the best obtained to-day.

Electrical Refrigeration

ONCE again our American friends are concentrating their energies upon a big electrical refrigeration boost. It will be heard of and seen in every city and important village in the United States from September 30th to October 7th, for during that Refrigeration Week electrical refrigerators will be in evidence practically everywhere. In the month of June 213,420 household models were sold. This was a record, and it brought the half-year's sales up to 666,750, against 589,955 a year ago. The estimate for the year had been put down at 800,000; this it is considered will be realised quite easily, while the previous objective of 1,000,000 may be reached, as it nearly was a couple of years ago. The "week" is being organised by the Electric Refrigeration Bureau of the Edison Electric Institute. Seven cash prizes ranging from $500 to $25 are being offered for the best shows on the basis of business results. Across the Atlantic they take electrical refrigeration far more seriously than we do. There are various grounds for this, but certainly our exceptional summer should have brought exceptional refrigerator business during the past few months.

Extraction Turbines

IN our leader of August 25th we commended the disposition of some supply engineers to place a wide interpretation on their duties as power specialists as exemplified in the taking over and operating of extraction turbines on behalf of manufacturers requiring low-pressure steam as well as electricity. A correspondent, whose letter is included in this issue, would carry this idea farther, and make the supply authority responsible for providing all forms of energy, but his suggestion that this should be done from large power stations situated in existing industrial centres appears to us impracticable as a general principle. Apart from the need to obtain cheap sites adjoining the power stations (since low-grade heat must be consumed near where it is produced) the large-scale generation of cheap electricity depends mainly upon the availability of an abundant supply of condensing water, which is not always obtainable at a low enough temperature, even for existing needs, in industrial areas. The better plan would be to induce manufacturers requiring large quantities of process steam to erect works in the neighbourhood of stations constructed with the efficient generation of electricity as the primary aim, thus forming the nuclei of new industrial areas in situations where coal is cheap, water plentiful, and rail or water delivery of goods is easy.



Recent Examples of Public Lighting

1. Arc lighting in Fulham, London (Kandem Electrical, Ltd.). 2. Holophane lighting at Worthing employing 200-W "Duo-Dome" refractors. 3. An installation at Cheadle by the Wardle Engineering Co., Ltd. 4. The east front of the Royal Pavilion, Brighton. 5. A demonstration installation of G.E.C. gaseous discharge tube lighting at Margate. 6. Lighting at Newcastle by the Edison Swan Electric Co., Ltd.

Solid Intermeshed Distribution. By P. F. Stritzl, D.Sc.(Tech.)

Modern methods providing improved reliability and economy

THE general desirability of feeding all consumers from as many sub-stations as possible has led to the partly or fully intermeshed l.p. distribution schemes. By intermeshing a l.p. network into one grid the voltage becomes practically independent of heavy local load peaks, and even on full short-circuit the voltage drop is noticeable only in the immediate vicinity of the fault for about 0.1 second, rendering it practicable to use large s.c. motors without special provision for reducing the starting currents. The intermeshed network excludes every possibility of a supply failure, except through a total h.p. breakdown, provided there are means to ensure that l.p. faults clear themselves "on the spot," and for dealing with the very high reverse currents resulting from partial h.p. failures. For the scheme to be applicable to existing networks it must not entail costly alteration.

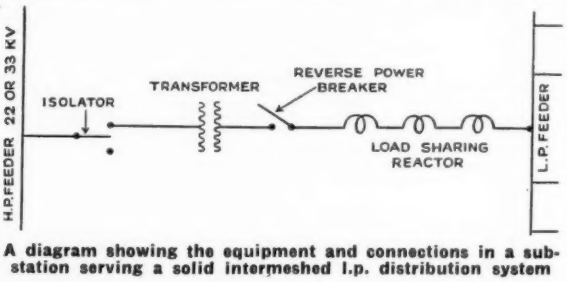
The Berlin Electricity Works (B.E.W.A.G.), in co-operation with the A.E.G., has adopted a scheme which meets these requirements, and there are similar networks in about fifty U.S.A. towns, although the American apparatus is not suitable for pressures of 220/380 V or more.

A faulty cable section is cleared by one of two methods: the blowing of a junction-box fuse or alternatively by relying on the cable itself to burn out in the immediate neighbourhood of the fault. The former method was made applicable by the development of a selective high power network fuse. In order to investigate the suitability of the second method, B.E.W.A.G. has carried out extensive tests on various types of cable in air, embedded in sand with brick covering, and also in steel and fibre tubing, and all faults to earth and phase "shorts" of up to 18,000 A were cleared within less than three seconds. Some of the intermeshed network districts in Berlin were fitted with current limiting reactors, and they have been in satisfactory operation without fuses for two or three years.

Elimination of H.p. Sub-station Switchgear

Another important advantage of the solid intermeshed system is the elimination of h.p. switchgear in the sub-stations, thus making it possible to dispense with intermediate voltages and to connect distribution transformers direct to the 22- or 33-kV supplies.

A faulty h.p. feeder would be fed from the l.p. side through the transformers connected to this feeder, and protection against reverse power becomes necessary in every sub-station.



A diagram showing the equipment and connections in a sub-station serving a solid intermeshed l.p. distribution system

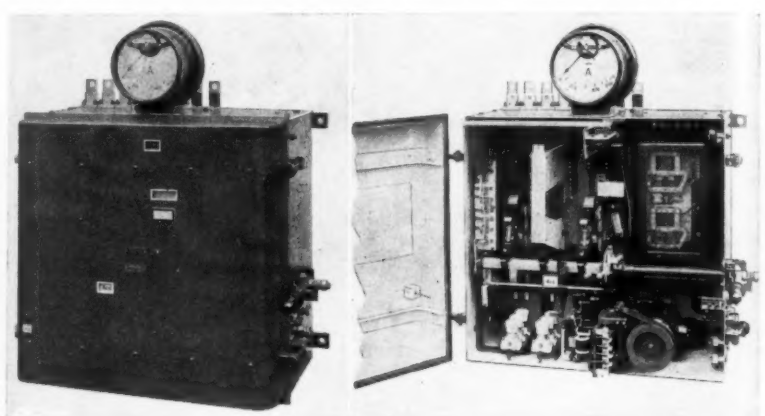
A reverse power relay controlling a l.p. circuit breaker serves for this purpose.

There is no need—indeed, it is not desirable—for a sub-station to be equipped with any excess current protection against forward current, either on the h.p. or the l.p. side. The circuit breaker must be capable of withstanding the maximum possible l.p. short-circuit current for several seconds, so as to give the necessary time for the l.p. fault to clear itself locally.

A sub-station equipped for distribution along these lines contains no h.p. switchgear, with the exception, of course, of isolating switches. On the l.p. side of the transformer are a reverse power circuit breaker, an ammeter and the load sharing reactor.

A h.p. fault on such a system only causes the sub-stations on the affected feeder to be separated from the l.p. network, without the l.p. supply being interrupted anywhere. The load of any sub-station rendered inoperative by such protection is taken over by the neighbouring sub-stations which, of course, should share the load evenly, and to ensure this is the function of the load sharing reactor.

Provided the reverse current relays are sufficiently sensitive the system also permits the arbitrary disconnection of any number of transformer stations, in order to eliminate their no-load or light-load losses. Disconnection of the feeder circuit breaker in the power or main switching station results, in turn, in the transformer taking its no-load current from the l.p. network, and in the reverse power relay tripping the l.p. circuit breaker, the reverse power relay remaining connected between the l.p. transformer and network terminals, across an auxiliary resistance. Reclosing the reverse power breaker is automatic, and is achieved without using pilot wires. By simply reclosing the h.p. feeder breaker the reverse power relay is subjected to a differential voltage, and if the network voltage is below a predetermined value the reverse power breaker closes.



A 600-A reverse power circuit breaker complete with operating relay

It should be borne in mind, however, that the saving in transformer losses is obtained at the expense of increased copper losses in the l.p. network, and probably in the majority of cases it is better not to disconnect the transformers on light load, and thereby to improve the reliability of the whole system.

The B.E.W.A.G. developments show how a network can be converted gradually with the greatest advantage. Where new sub-stations or new cables would be needed, intermeshing is carried out instead, and as a result the intermeshed districts are gradually increasing in size until, at the end of, say, ten years or more, a large district will have been converted without any noticeable increase of expenditure.

The success of the scheme has, of course, depended on the development of the reverse power circuit breaker, and an indication of the advance made in this connection is that the latest type of 600-A equipment, suitable for short-circuit currents up to 30,000 A, occupies a total space of not more than 2½ ft. by 2 ft. by 1½ ft., including the relay and auxiliary equipment.

Improved Radio Valves

THE "Osram" B21 valve recently introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, works on a combination of q.p.p. and positive grid drive class "B," combining the advantages of both systems and eliminating many of the disadvantages, and it differs from the ordinary class "B" type valve in that it works with a small negative grid bias. In this way the impedance of the associated circuits can be reduced and the tendency to introduce spurious oscillation (the cause of distortion) avoided, so that much of the inherent distortion of class "B" amplification is removed.

Each of the triode sections is in itself designed with a double grid, and these two grids are internally connected so that there is no added complication to the user. The total filament current for the two sections of the double triode is only 0.2 A, and an entirely new form of bulb gives an extremely small and neat appearance, together with a rigid electrode construction. The electrodes are actually held rigidly within the glass bulb by means of specially shaped mica supports.

To work with the B.21 a new driver valve L.21, has been specially designed to give the greatest power output with the lowest h.t. current consumption. An example of the economy of running the combination, is that with a h.t. battery of 120 V the total quiescent anode current is only 3.65 mA, which swings up to an average value of 6 mA for the B.21 when giving an undistorted power output of approximately 1,000 mW.

Neon Sign Protection. By E. A. Beavis

Improvements in equipment reducing risk of fire

THE number of advertising signs erected in this country is rapidly increasing and, although improvements in gaseous tube construction and manufacture are gradually enabling lower voltages to be adopted, the majority of these equipments are still of the cold-cathode luminous discharge variety.

These tubes require a high voltage for striking (the nominal working pressure may vary from about 2,000 to 6,000 V) but the transformers supplying the circuit must have an open-circuit secondary voltage of at least double the working value, thus raising the peak voltage to nearly three times the nominal tube figure. Although these transformers are of small output, the high voltage represents a danger which which must be properly guarded against.

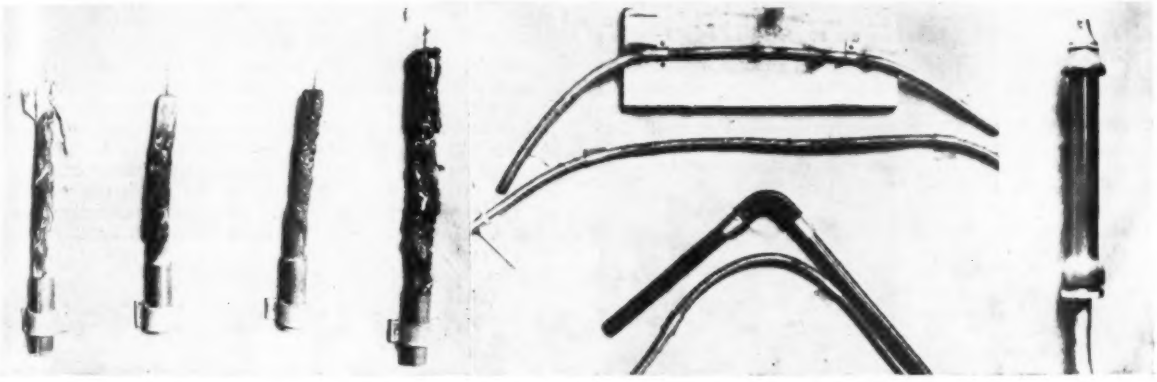
The I.E.E. "Regulations for the Electrical Equipment of Buildings" do not, however, appear to be as adequate as they might be to cope with these installations, particularly with regard to the possibilities of danger from fire, which is perhaps the most important of all and the most difficult with which to deal. The provision of an easily accessible fireman's switch, as the name implies, is merely to facilitate matters in the event of fire, and to lessen the consequencies of such a disaster. The use of flameproof and incombustible material, wherever possible in erection, helps to this end, but does not prevent such a contingency from arising.

Cable Connections

The cable employed for connecting the secondary circuit usually has rubber insulation, which, on account of the high peak voltage and secondary oscillations occurring in this type of circuit, must have high dielectric strength, and should, wherever possible, be screened with a tight metal sheath, to confine the electric field to the insulation alone. There is no doubt that the cable has been responsible for a great deal of past trouble, which has occurred chiefly at the terminations where the tubes are connected; and improvements in this respect, by giving a little more elaborate protection at very little increased cost, will go far to mitigate the risks of fire.

Normally at these cable terminations the sheath is stripped back for six inches or so and the exposed insulation is varnished and taped over and finally covered with a bell glass. This method of sealing the cable end, although possibly ozone-proof, is no protection against surface leakage effects, and where moisture condensation occurs to any appreciable extent on these ends, discharges take place, gradually burning through the insulation and ultimately setting the rubber alight. These effects can be produced in the laboratory in a few minutes, and must occur in practice when damp is fairly prevalent, although the ultimate breakdown may take many months to come about. The results of some of these experiments are shown herewith, and they resemble to a remarkable extent many of those which have actually occurred in practice.

The only method of definitely avoiding this possibility is to cover up the cable insulation and tube terminal in such a way as not to expose any high-voltage connection to the atmosphere, either by a special type of insulation tape extending from the cable sheath and over the tube end, or by totally enclosing the cable end in an impervious material which is non-inflammable. Such a fitting must be waterproof and can be made effectively so by filling up with some hard bituminous compound. Such a sealing end made of porcelain is illustrated, and tests on this type of cable termination have been carried out at voltages of 20,000 and over for long periods with satisfactory results.

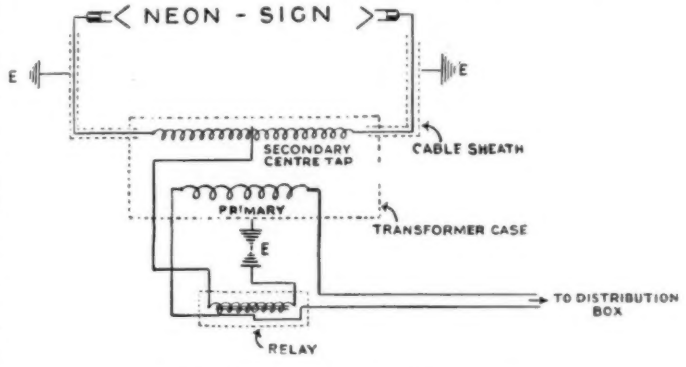


Left: Cable ends burnt up by surface leakage effects. Centre: Ozone effects on unscreened rubber cable. Right: Porcelain sealing ends

Protective Relays

In some cases ordinary unsheathed rubber leads are used, and these are likely to give trouble should they pass through, or come into contact with, any earthed material, since at such points the external field is strongly localised and ozone cutting is bound to occur—unless these cables are specially prepared. Examples of these effects are indicated in the illustration, which shows discharges and ozone cuts produced by earthed clips and wire bound round the rubber insulation, and also the breakdown at a bend in conduit containing unscreened rubber cable.

When a cable breakdown occurs in practice, either due to weakness of the dielectric or to excessive leakage at the cable ends as already explained, the high-voltage winding of the supply transformer becomes partially short-circuited; but on account of its high reactance there is very little increase in the current flow. In consequence there is no possibility of the fuses and cut-outs acting on the primary side of the circuit, and the fault current continues to flow, gradually burning up the cable. The main illumination of the sign is naturally extinguished, but flickering takes place from the capacity effects of the live side, and this is the only indication that there is anything wrong with the installation.



A neon tube circuit with protective relay

Herein lies the greatest danger of fire, and to eliminate this it is necessary that some form of cut-out shall operate from the secondary circuit directly such a fault develops. This can be done by means of a relay which passes the secondary leakage current and is set to operate at a certain fixed maximum, well above that likely to be encountered under normal working conditions. The setting must not be greater than the short-circuit value of the transformer current, which is probably about 50 mA, otherwise the relay cannot operate, but a fair range of sensitivity is permissible, as the leakage current of any one section is unlikely to be more than a few milliamperes. Directly a cable fault occurs and the leakage current reaches the fixed value, the relay comes into action, breaking the supply to the transformer,

and the relay must be reset before the supply can be restored.

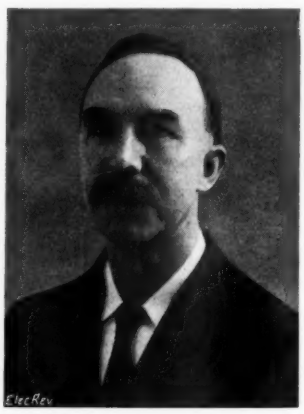
The most sensitive arrangement would be a relay to each transformer, so that the contacts would pass the primary current and the faulty section of the sign only would be cut out. If necessary, remote control of cut-outs on the main supply could be fitted, in which case the whole equipment would be shut down on the occurrence of a fault, or possibly this could be accomplished by a single specially designed relay operating on the total leakage current of the whole circuit. In the latter case the insulation of the installation would need to be kept fairly high as the sensitivity would depend upon the total leakage present under the worst possible conditions.

The main operating factor is the cable leakage to earth, and as the cable sheath is definitely earthed, the relay could be connected between cable sheath and transformer case, provided the latter could be lightly insulated. The regulations, however, require the transformer case to be earthed, and so make it necessary to bring the transformer centre point connection to one side of the relay, the other side being earthed as shown in the diagram. For practical application of this device it should be possible to incorporate a relay in each transformer casing, or to arrange for the necessary number of relays to be fitted to the distribution board, thus protecting each separate section of the installation and practically eliminating all danger of fire.

The improvements put forward herein are the result of experimental investigations carried out at the works of Messrs. Siemens Bros. & Co., Woolwich.

Electric Motor Cooling. By J. F. Romer

AIR cooling of electrical machinery has been tremendously developed in recent years, but, judging by the way many ventilation systems are designed, the mechanics of air motion is not clearly understood, with the result that cooling frequently fails to come up to expectations and windage losses are unduly high.



Mr. J. F. Romer has had long experience in the design of electric generators and motors and is now a consulting designer

It is commonly assumed that air flowing through ventilating passages behaves like compressed air. This is not so, as the compression corresponding to a velocity of 9,000 ft. per min., for example, at average barometric pressure, is only about 5 oz. per sq. inch, which is negligible. The air behaves practically like an incompressible fluid with considerable inertia, and, when travelling at high velocity, if there is a sharp turn, eddy currents will be produced with constriction of flow. Although in most cases the air receives its motion by contact with radially placed revolving conductors, it is not thrown off radially but almost tangentially.

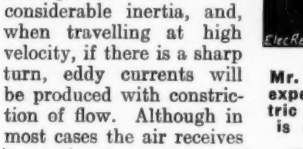


Fig. 1

Fig. 1 illustrates this; A represents the peripheral velocity of the rotor, B the velocity of air through the duct, usually about 1/5 of A, and C the resultant velocity. There is consequently only a limited force available to accelerate the air, and if there is a sharp turn anywhere in the circuit the velocity of the air will not be increased, but eddy currents will be produced with great reduction in the quantity of air flowing. This is illustrated by fig. 2, which is a diagram depicting part of a d.c. motor having radial armature ducts exactly opposite similar ducts in the field system. The air flow is indicated by the dotted arrows, and, as will be seen, only a small part of a duct is useful. Although the ducts are amply large enough there is considerable constriction at X, and spacing pieces placed where shown by the dotted circles E would obstruct the air flow so greatly as to reduce the ventilation practically to zero. In many cases machines are made with armature ducts but without corresponding ducts in the field magnet. It will readily be seen that the ventilation with such machines is negligible, as the air cannot move axially because of its inertia.

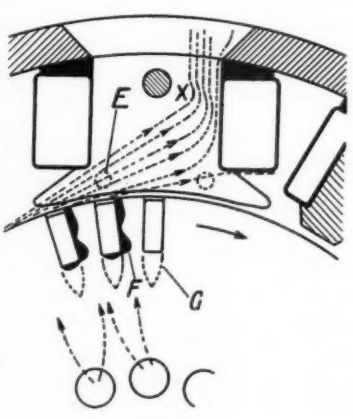


Fig. 2

To investigate the flow of air through ducts I made a working model consisting of two plates representing the sides of a duct and having projections between corresponding to conductors. The plates could be readily taken apart. The rotor was run up to speed and a small quantity of flour drawn in; part of this was found deposited on the plates wherever the air made no forward motion, indicating constriction very clearly. This is shown by the black areas F in fig. 2. By fitting stream line spacers indicated by the dotted lines G this constriction and the collection of dust could be entirely avoided.

A good design from a ventilation point of view is illustrated in fig. 3. The poles are split down the centre, the two halves being held together by end clamping plates. Radial ducts, shown by the unsectioned part of the pole, are opposite similar armature ducts, the air flow being shown by dotted arrows. The air, after passing the centre of the pole, can spread out axially, with the result that there is practically no constriction. The quantity of air which can pass through the pole ducts is about five times as great as in fig. 2. Although practically half the periphery of the armature can throw off air, only that coming from the part J to K can escape through the field magnet ventilating ducts, so that only about an eighth of the armature produces a useful ventilation. This illustrates one of the great advantages of axial ventilation; the air can move steadily through the axial holes without interruption, and the mean velocity, upon which the quantity of air passing depends, is very much higher.

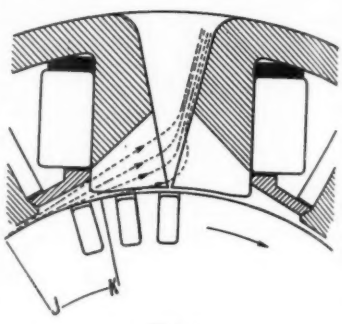


Fig. 3

Fig. 4 shows part of a radial ventilated induction motor. Most of the air coming off tangentially cannot pass the stator conductors and is actually deflected inwards by the wedges, with the result that the ventilation is exceedingly poor, a mere film of air on one side of the stator conductors being all that comes through. It would be much better in this case to use axial ventilation through holes in the stator and rotor.

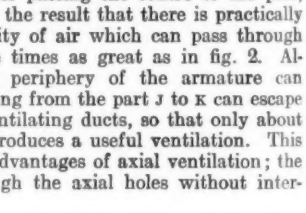
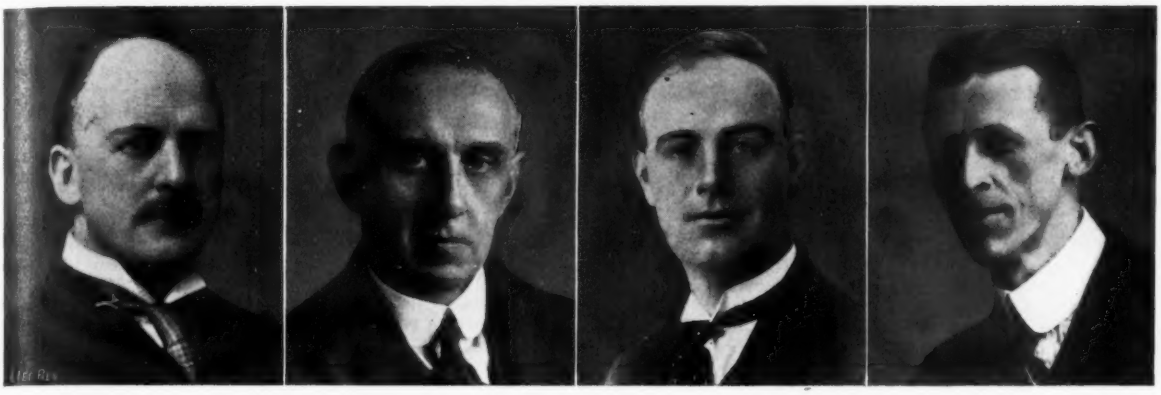


Fig. 4

The Effect of Impure Air on Commutators

WHERE electrical machinery is working in an atmosphere contaminated by fumes, in chemical works and refrigerator plants, for instance, bad commutation is liable to occur as the fumes may react with the copper and form a surface skin. This skin will have a higher resistance than the copper segments or slip rings, causing overheating and more or less severe sparking. Very often copper picking can be traced to this cause. The remedy is to use either totally enclosed forced-ventilated motors or to install the motors in a separate room ventilated by pure air drawn from outside. Where neither of these alternatives can be adopted, cleaning the commutator before or just after starting up will effect some improvement, as the skin only forms during the stand-by periods.—W. E. W.

Some Municipal Electrical Engineers



From left to right: Mr. E. Seddon (*Jas. Bacon*), Edinburgh; Mr. F. E. Spencer (*Lafayette*), Birkenhead; Mr. M. J. Mortimer, Loughborough; and Mr. F. H. Corson (*Elliott & Fry*), Gloucester.

The Technique of Ebonite Manufacture. By F. A. Middleton

IN the preparation of many ebonite articles assembly is made from thin sheets produced by calendering. Unless accurate regulation of speed, temperature, and condition of the rubber mix is maintained, assembly may be rendered difficult through lack of adhesiveness, or the presence of air-pockets will spoil the vulcanised product.

The rubber is processed in sheets of between 0.8 and 1.0 mm. thick, and built up to the required gauge in one of three ways: (a) By allowing the sheet to make a number of revolutions round the bottom bowl of the calender; (b) by employing a "doubling drum" on the calender; or (c) by assembling individual sheets by hand and rolling them smooth with a heavy roller. The advantage of the last method is that it permits of a close checking of every square inch of gum, so that only sheets of good condition, free from air-bubbles and blemishes, are built up.

A mixing of the following parts by weight has good insulating qualities, and is used in the production of sheeting: purified smoked sheet, 100; sulphur, 50; carnauba wax, 3; cottonseed oil, 3; accelerator of vulcanisation, 2.5.

Vulcanising and Polishing Methods

Lengths of unvulcanised rubber are shaped by being extruded through dies by means of a powerful screw. The extrusion machine is used in the production of rods and tubes, especially, but also such components as accumulator separators. For the last, although poorer qualities of hard rubber (*e.g.*, those containing reclaimed rubber or rubber waste) may be successfully employed, close control of vulcanising conditions is essential. Slight over-vulcanisation is not attended by serious consequences with most ebonite goods, but contact with acid soon renders over-cured separators brittle. The over-cured condition is difficult to detect, and can only be properly guarded against by experimentally determining the optimum and rigidly enforcing adherence to the vulcanising specification thus evolved.

For producing articles from calendered sheets, two methods of vulcanisation are employed: either the rubber is moulded, and cured under hydraulic pressure, when a dull surface is produced which must be polished, or it is pressed between sheets of tin or aluminium foil and vulcanised in a water-bath.

Sheets up to half an inch in thickness should be cured by gradually raising the temperature of vulcanisation from 212 deg. F. to 265 deg. F., over a period of an hour, maintaining the latter temperature for two-and-a-half hours, and finally dropping it to the original temperature in fifteen minutes, after which it is thoroughly cooled with water. For sheets of from one-half to one inch, the rise should be of three hours' duration, and the full curing temperature maintained for only an hour and a-half. If aluminium foil has been used, and the surfaces were quite clean at the beginning, the foil may be used many times; with tin, it is usual to find small pieces of the metal adhering to the ebonite.

Many articles—coil mountings, knobs, dials, plugs, sockets, telephone parts, and so on—must be moulded outright; polishing is then indispensable. For some of these articles, it simplifies manufacture and enables far greater accuracy to be obtained, to mould them from ebonite dust. This dust is not the proceeds of scrap, but is deliberately produced in this form from rubber and sulphur. Large sheets are vulcanised, then broken up and softened in an oven, to be finally ground into a fine powder between mill rolls.

The production of a high lustre requires three separate processes: pumicing (in order to smooth out surface inequalities and facilitate subsequent polishing), and two stages of polishing, preliminary and "fine." The first of these usually employs a buffing wheel of 12-in. diameter, revolving at 1,500 r.p.m. If the article is rough and has corners and mould spew to be removed, the wheel must be hard, but if the surface is flat, a hard wheel will set up cracks, and produce unevenness. Chamois leather gives probably the most satisfactory results, and, although expensive, is durable. Other materials which have been used from time to time are wool waste, dried maize leaves, blanket cloth, and certain seaweeds.

Both the ebonite and the buffing-wheel are soaked in a slurry of pumice powder and water, to which coal dust or lamp black is added if an intense black surface is desired, for this process. Very small articles can be satisfactorily pumiced by rotation in a cask containing pumice powder, but from twenty-five to thirty hours must elapse (at a rate of 30 r.p.m.) before the operation is complete.

For the preliminary polishing, buffing wheels of flannel or pile-raised beaver are employed; these wheels vary in size according to the fineness of the work, but all rotate at a speed of at least 1,500 r.p.m. Tripoli earth is made into a thin paste with water to provide the polishing medium, and the most essential precaution in the process is to ensure constant movement of the article across the surface of the wheel. If this is not observed, the ebonite will burn as the result of friction, ruining its surface. Rotation in a cask may also be practised, using the earth in the form of small granules.

Mixed with rape oil or petroleum spirit, Tripoli earth also imparts the final lustre to the surface of the ebonite, either in conjunction with a wheel of beaver or an automatic device employing a series of cones revolving in contact with the ebonite article while supported upon an oscillating carriage.

Machining Processes

Hard rubber is best cut with band saws or carborundum cutting wheels, the former running at a speed of 5,000 ft. per minute, and the latter at not less than 2,000 r.p.m. Thin sheets, however (up to $\frac{1}{8}$ in. thick), may be laid on a steam-heated table, and cut with a power knife. When this is done, care must be taken that the ebonite does not warp on cooling, and it is usually laid on a perfectly flat surface under heavy weights. The same applies to punching.

Turning and milling will require diamond-point tools to be used for very fine work, while for general purposes high-carbon steel or red stellite are hard enough. A speed of at least 100 ft. per minute is desirable, and tools must be frequently ground. For drilling, high-carbon steel tools are also necessary, with points ground to an angle of 45 deg.; lubrication can be properly ensured only by using soda solution. Holes of under $\frac{3}{8}$-in. diameter should be bored with the drill revolving at 1,500 r.p.m.; larger sizes will demand appreciably lower speeds.

Popular Refrigerator Sizes

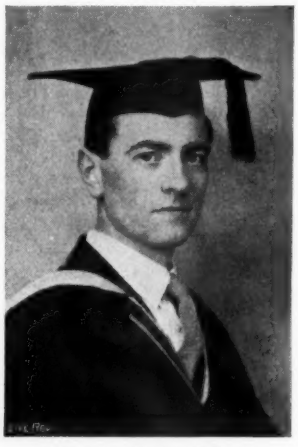
According to statistics supplied by the National Electrical Manufacturers' Association of America, the most popular sizes of domestic refrigerators sold in that country during 1932 were from 4 to 4.99 cu. ft. storage capacity, the sales of this class being 38.2 per cent. of the whole. Next in popularity were those of from 6 to 6.99 cu. ft., 25.3 per cent., and third on the list are models with capacities of 5 to 5.99 cu. ft. (19.8 per cent.).

A Domestic Tariff. By J. L. Ferns, B.Sc.

The search for an equitable and comprehensible system

THE large number of different tariffs in existence is due to there being over 600 independent supply undertakings which have introduced methods of charging to suit their own ideas. There are at the present time no fewer than four different principles on which tariffs are based: (*a*) cost of supply; (*b*) commercial value of the supply; (*c*) expediency (*e.g.*, competition of gas); and (*d*) special purposes (*e.g.*, load-factor improvement).

One can find all four principles in operation in one undertaking, and, consequently, there must be many consumers who are overcharged (as regards principle (*a*)) and many who are undercharged. If tariffs were reorganised on the lines of principle (*a*) there would be many satisfied and many dissatisfied consumers. Thus the questions to be answered by the tariff reorganiser are: "Can the latter be ignored for the sake of the former?" and, "If we ignore the latter type will their custom be entirely lost due to gas or prime-mover competition?" Even though supply undertakings have "monopolies," they still have strong competitors such as gas undertakings and disabilities such as low load factors, which prevent a thorough overhaul of electricity tariffs. (An interesting fact to remember is that the raising of the national load factor from 25 per cent. to 35 per cent. would affect the average price per kWh to the same degree as a 100 per cent. reduction in the price of coal.)



Mr. J. L. Ferns, B.Sc.

It appears impossible to put principle (*a*) into full operation in an area unless practically every building in that area is electrified. It follows that under the present conditions there are consumers who must be undercharged (or be on the borderline) if we desire their custom.

It is generally agreed that there are "snags" in all existing tariffs. The characteristics of the ideal tariff are: (1) The consumer should be charged as nearly as possible on the cost of supply principle (according to his type of supply and not his local circumstances); (2) higher load factors should be encouraged; (3) it should be readily understood by the consumer; (4) it should not differentiate between the consumers at various parts of the system; (5) when generation is at a site away from the load centre, the cost of the h.t. network and transformers should be included in the generation costs; (6) as there is usually no direct connection between the cost of the undertaking's l.p. network and the cost of the generating plant the fixed charge should contain two elements; there is also the point that the cost and size of the service usually bear no direct relation to the domestic consumer's load; (7) regard should be paid to the tendency of the ratio of l.p. distribution capital to generation capital to increase rapidly; even now distribution charges exceed the generation charges, thus making the present types of two-part tariff incorrect; (8) the diversity factors of the various classes of consumer should be taken into account; this implies that mains engineers should be fully aware of loading conditions everywhere.

A Threefold Consideration

Consideration of all these points leads me to suggest the following general form of tariff which contains three separate items: (1) An energy charge for each kWh consumed; (2) a "conductor" charge as a fixed annual payment to cover interest and sinking-fund charges on the capital cost of providing the consumer's share of the undertaking's conductors; and (3) a "generator" charge, as an annual payment, based on the consumer's maximum-demand, to cover the cost of providing the consumer's share of the generators or bulk supply m.d. charge. The rates of charge should be reviewed every three years.

The charge per kWh in item (1) will be slightly higher than the cost of production, as it is on this item that the undertaking will make its profit, if any. The rate of charge in item (2) is determined from the undertaking's analysis of capital expenditure on mains in the common-sense way. Average figures will be used and not the particular figures for the consumer concerned. It must be borne in mind that the fixed charges are not applied merely to pay off the capital cost of the consumer's personal installation. For many years the undertaking will have to find large sums of money to pay the interest and sinking-fund charges on its expanding network and increasing generator capacity. The principle that the undertaking is in existence for the sake of everyone in the area makes it essential to spread these more or less fixed costs equitably amongst all the consumers. This principle seems to be overlooked in many tariffs.

The rate of charge in item (3) is determined from the fixed costs involved by the generating plant, the undertaking's maximum demand, and the consumer's diversity factor. If the consumer takes more than 40 kW, then his m.d. can be found by means of a maximum-demand indicator in the usual way. For smaller consumers this charge must be fixed arbitrarily, but the charge should be determined by finding the average kW demand of the particular class of consumer concerned and dividing this figure by the corresponding diversity factor.

The explanation of the tariff to the existing or potential consumer would be very easy; each item on the bill has a simple, direct title which expresses succinctly and correctly the basis for the charge. The reason for each item would be clear to the most ignorant consumer, particularly if a small but vivid picture was placed alongside each item, owing to the direct connection of each with tangible physical realities.

Answers to Objections

There can be no objection to item (1) so far as the consumer is concerned. One objection to item (2) will be that those consumers who are easy to supply have to bear some of the cost of supplying the more inaccessible consumers. This is quite in order, as the undertaking is in existence to supply the whole (eventually) of the people in its area and not the favoured few near the power station or sub-station sites.

With regard to the method of assessing the fixed charge, it may be held that a factory owner who puts in a large service but whose load does not reach the expected figure will be penalised for ever on this account, but if the consumer had installed his own prime-mover he would have been in just the same (or a worse) position. With an electricity supply he has the satisfaction of a reduced fixed charge if his m.d. falls or does not reach the expected figure, whereas with his own prime-mover he would be saddled with a definitely fixed charge until the expenditure on the engine was written off. The accuracy of item (2) as a basis for making a fixed charge is indisputable, and the only important commercial objection that can be raised is a doubt about its attractiveness to the potential consumer. This is a matter for practical experience, as psychological points cannot be proved by technology.

As regards item (3), the reduction would permit a manufacturer greater scope as regards his load factor and considerably reduce his objection to the maximum-demand indicator. To the small consumer item (3) is not very large compared with item (2) when diversity factor is taken into consideration.

It may be claimed that large domestic or shop-lighting consumers, for instance, will benefit considerably under item (3), but such consumers are entitled to some benefit from the heavy borough rates (the article is written from the municipal view) which they have to pay. There is also the fact that, owing to their relatively large consumption of energy, the excess paid under item (1) compensates somewhat for the advantage they receive under item (3).

It may be said that the grouping of the various types of small consumer will prove rather difficult, but in my opinion the classification will eventually be in the following straightforward form:—

Type.	Approx. kW Rating for Item (3).
House lighting	½
Shop lighting	½
Radiators	1
Cookers	2
Multiple-office building	¼ (per suite)
Small warehouse or workshop lighting	½
Large warehouse or workshop lighting	1
Motors for small warehouses or workshops	1
Motors for large warehouses or workshops	4

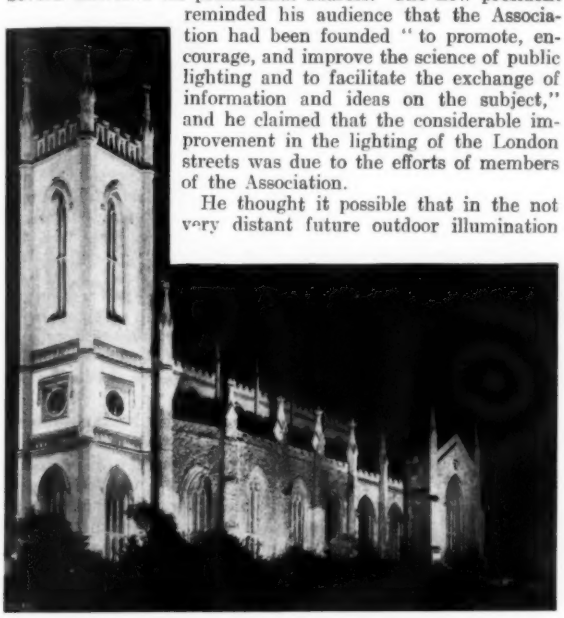
As the heavier fixed charges (distribution) are definitely met by item (2), the undertaking can afford to be lenient

The Public Lighting Conference

A record of progress

THE tenth annual conference of the Association of Public Lighting Engineers opened at Margate on Monday evening with a reception at the Winter Gardens by the Mayor and Mayoress of Margate (Ald. F. L. and Mrs. Pettman), which was followed by a dance. On Tuesday morning, after the Mayor had welcomed the delegates, Mr. E. M. Severn delivered his presidential address. The new president reminded his audience that the Association had been founded "to promote, encourage, and improve the science of public lighting and to facilitate the exchange of information and ideas on the subject," and he claimed that the considerable improvement in the lighting of the London streets was due to the efforts of members of the Association.

He thought it possible that in the not very distant future outdoor illumination might be achieved by the use of a few powerful light sources suspended high over towns. In 1899 the streets of South London were illuminated by 28,000 candles; in 1932 the figure was nearly 3,500,000 candles. The demand for better lighting was due in part to the development of mechanically propelled vehicles. The considerable variation in the standard of lighting between different places was responsible for a large proportion of the accidents that occurred after dark, and the ratio of night accidents to the total had been increasing for years. To secure the interest of the public in good lighting, practical demonstrations of its merits were necessary. The Council of the Association proposed to take steps to ensure that future members were possessed of the requisite qualifications.



Trinity Church, Margate, floodlighted by the G.E.C.

Mr. H. V. Emptage then gave particulars of the public lighting of Margate (of which he is superintendent). He said that in 1919 the town had 1,203 gas lamps (max. c.p. 300) and twenty-four electric lamps (max. c.p. 150); now there were 1,799 gas and thirty-four electric lamps (max. c.p. 500) lighting 50½ miles of streets. The price of gas is 7½d. per therm, less 5 per cent. (c.v. 460 B.th.u.) and of electricity 2½d. per kWh. The hours of lighting per annum were 3,509 for all-night and 1,896 for midnight lamps. All lamps were fitted with clock controllers, which were set weekly. The highest number of lamps looked after by one man (winding, setting and maintenance) was 209. The public lighting rate was 5.91d. in the £.

Mr. Emptage's paper contains as an appendix some useful particulars of the special demonstrations of lamps and lighting equipment under working conditions which have played so remarkable a part in this year's conference, and also a map indicating their situation. Three firms have taken advantage of the permission granted by the Corporation to put in temporary installations of the new discharge lamps with special directional fittings. The British Thomson-Houston Co., Ltd., has suspended a "Mazda-Mercra" 400-W lamp below the cross arm about 6½ ft. from the centre of each tramway standard in Athelstan Road; the height is 20 ft. 6 in. above ground level, giving illumination values of from 0.3 to 1.5 ft.-candles. The unventilated lanterns are constructed mainly of copper and are fitted with special diffusing glass. The same company is lighting the Rendezvous site with circular opal-glass ventilated lanterns designed to give a spread of well-diffused light having an average illumination of 0.25 ft.-candles.

The General Electric Co., Ltd., has arranged several displays. These include five "Osira" 420-W lamps suspended from the tramway arms in Fort Crescent. These are mounted about 20 ft. above ground. Each lantern is designed to give 6,000 c.p. in the direction of the traffic and 3,000 c.p. towards the oncoming traffic, the general effect being similar to that on the Watford Road installation at Wembley, but with lanterns glazed on all sides to suit the central suspension system in this case. The even flood of light over the Winter Garden lawns provided by four more "Osira" lamps carried on span wires has a distinctly pleasing effect.

Siemens Electric Lamps & Supplies, Ltd., has equipped, on temporary posts at the corners of the Jubilee Clock Tower, four 375-W "Sieray" (hot-cathode) lamps. Provision has also been made to illuminate the four clock dials from the inside by "Sieray" 200-W coloured floodlight tubes.

Of the demonstrations of work done by filament lamps the most effective is the floodlighting of Trinity Church, the 115-ft. tower of which is so conspicuous a mark out at sea; the floodlighting was done by eighteen 1,000-W "Osram" gasfilled lamps in G.E.C. projectors. Other notable displays with gasfilled lamps were given by the same company on Fort Lower Promenade and the Winter Garden terraces.

The Engineering & Lighting Equipment Co., Ltd., has erected three "Pinnacle" directive fittings and two "Greenwich" fittings on existing columns on Fort Lower Promenade. The "Pinnacle" fitting gives the principal illumination at

"Revo" lighting in Leicester employing lanterns with symmetrical refractors mounted on tramway-pole brackets

---

A Domestic Tariff *(concluded from opposite page)*

in fixing the arbitrary kW figures for the various grades of small consumer and in assessing the border-line cases. It is particularly important not to restrict the development of the small consumers' load, as eventually they will be (in the aggregate) of far greater importance than the large consumers.

The suggested tariff gives the small consumer plenty of incentive to employ inexpensive but helpful appliances which can be used even on the lighting-circuit outlets, *e.g.*, smoothing irons, soldering irons, fans, shaving outfits, bowl fires, toasters, percolators, small kettles, &c. As the energy is supplied at the lowest possible price and there is no penalty for the kW installed or the number of outlets, the use of such appliances is removed from the realm of luxury. If people were not afraid to use these appliances (owing to their large consumption as compared with electric lamps) their use would grow extremely rapidly, because they constitute ideal gifts.

There is no danger of the undertaking losing money under item (3) due to the expansion of load of the small consumer. The average loads and diversity factors would be continually under observation, and any radical change would necessarily cause a change in the arbitrary assessment.

160 deg. between the main beams from each side of the fitting with a greater intensity on the road than on the kerb.

As a permanent feature of attraction at Margate, Mr. Emptage is using coloured strip lighting for the whole length of the Marine Terrace and Parade, 15-W internally sprayed lamps being spaced 36 in. apart.

The morning session concluded with an appropriate paper (illustrated by lantern slides) by Mr. W. N. C. Clinch on "The Lighting of Sea-side and Health Resorts." The author referred to the manifestation of the public desire for light in the success of the Summer Time Act. The attractiveness should be maintained after sunset by decorative lighting, which would popularise our seaside resorts in face of competition. The floodlighting of buildings (including hotels), fountains, the cliffs, and even the sea should not be overlooked. The underwater lighting of bathing pools would make them available for many more hours than hitherto.

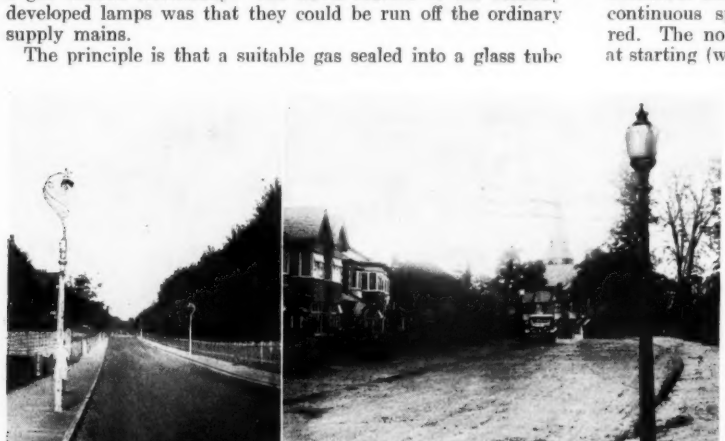
Mr. Clinch mentioned arrangements made with the householders and hotel proprietors in one town where the windows on different floors were bedecked with lamps of definite colours, thus presenting a ribbon effect along the sea front. The cost of such illuminations would be rapidly repaid to the municipalities by the increased popularity of the resorts and the extension of the season. Specially low tariffs could be quoted by the supply authorities for electricity used for illuminations.

Electric Discharge Lamps

After luncheon on Tuesday (as the guests of the Isle of Thanet Gas Light & Coke Co.) the delegates returned to Cliftonville Hall to hear Mr. G. H. Wilson read his paper on "Electric Discharge Lamps and their Application to Public Lighting." The paper was full of important data supplied by the B.T.H. Co., the G.E.C., the Osram Co. of Berlin, Philips, and Siemens Electric Lamps & Supplies, and was well illustrated.

Mr. Wilson stated that a large tungsten lamp had an efficiency of 17.4 lumens per watt and that only about 13½ per cent. of the total energy was converted into heat. Illumination depended on high temperature, but to achieve the highest efficiencies the source must radiate only within the visible spectrum, which a hot body could not do. The discharge lamp emitted light not from a white-hot body but from a gas excited electrically. The novel feature of the recently developed lamps was that they could be run off the ordinary supply mains.

The principle is that a suitable gas sealed into a glass tube with an electrode at each end would conduct electricity; if the gas pressure was low light would be produced when conduction took place. The application of the dull-emitter filament (which sent off a copious supply of electrons when heated to a low temperature) to the discharge lamp reduced the voltage required to that of the supply mains and enabled the current through the tube to be increased so as to produce from a 2-ft. tube as much light as that from a 50-ft. h.v. cold-cathode tube.



Examples of street-lighting fittings made by the Engineering & Lighting Equipment Co., Ltd. Left: Two-way "Pinnacle" directional fittings as used in St. Albans. Right: The "Greenock" pole-top unit housing two 100-W lamps over 100 of which have been installed at Arnos Grove

The early experimental hot-cathode lamps were developed for the efficient production of coloured light, but successful efforts had been made to produce lamps which gave light approaching white in colour. Several types of lamps were described that had passed beyond the experimental into the practical stage. The coloured tubular lamp had been developed for the production of red, green, and blue light (depending on the gas employed) mainly for floodlighting. The two hot-cathodes were tungsten spirals round a core of alkaline earth oxides, which acted as the electron emitter. Light was emitted by the luminous column, which uniformly filled the tubes between the end bulbs.

Connection to the a.c. mains was through a choke coil, which was required to stabilise the discharge, which, like an arc, had a negative resistance. The lowering of the power factor by the choke could be rectified to 0.8 by connecting a condenser in parallel with the lamp, but the value could not be brought to unity as the current wave through the lamp was not sinusoidal. A small transformer was required for the external heating of the cathodes. The high striking voltage was obtained by including in the circuit a small Tesla transformer fed from an additional winding on the filament transformer; when the discharge had struck and the voltage across the latter had fallen to its running value, the Tesla transformer ceased to operate.

These lamps had been constructed for 200 to 250-V a.c. circuits with a rating of 470 W for red and 350 W for blue or green. Red, green and blue gelatine colour filters gave transmission values of 15, 18 and 10 per cent. respectively, so that the hot-cathode tubes had between twice and four times the efficiency of the combination of the filament lamp and filter. The life to be expected was from 1,300 to 1,400 hours.

Sodium- and Mercury-vapour Types

The operation of the a.c. sodium-vapour lamp was similar to the foregoing, but no Tesla coil was required as the discharge was self-striking on 220 to 250 V mains. A second type suitable for series connection on d.c. mains was described in our issue of December 9th, 1932. The sodium lamp radiated practically on only one wavelength. In the mercury-vapour lamp, discharge took place at a far higher pressure than that used in the coloured tubes. The two emitting cathodes were sealed in a cylindrical glass bulb, containing mercury vapour and other gases, which was surrounded by an evacuated glass envelope. The luminous column was constricted to a narrow cord of light. It could be connected to a.c. mains through a stabilising impedance and was self-striking. A power factor of 0.83 was obtainable by the use of a 20 mF condenser.

The overall efficiency was 40 lumens per watt for a 420-W lamp, which had a life of about 1,500 hours. There were numerous lines in the spectrum and also a certain amount of continuous spectrum giving a blue-white light deficient in red. The normal running current was 2 A and the current at starting (which took about three minutes) 4 A. Hot-cathode lamps could be used in existing street fittings, but the best results were achieved with special fittings.

Lighting in Ireland, France, and India

On Wednesday the technical session started with a paper by Mr. F. X. Algar on "Street Lighting by Electricity in the Irish Free State." Mr. Algar said that in the year ended March 31st, 1930, the consumption for public lighting was 4,323,000 kWh, costing £36,000; in the year ended March 31st last the figures were 7,989,000 kWh and £65,000. The Supply Board held 164 public lighting contracts, involving 15,327 lamps with an aggregate wattage of over three million in various parts of the Free State. An increasing interest was being taken in the subject by local authorities, though the lighting of Dublin, where reorganisation presented a number of difficulties, might give a wrong impression to the visitor to Ireland. Three types of lamp fittings had been selected for general use: (1) a dispersive type enamelled metal reflector; (2) a metal-reflector type with ring-shaped opal-glass shade; and (3) a plain metal reflector for minor streets and lanes.

After the official luncheon Mr. J. W. Partridge gave a description of the street lighting of Paris. He said that all the equipment was designed for twin-filament lamps usually 200 and 500 W, the smaller filament replacing the other at midnight. Normally prismatic bowl refractors were used. Two mercury tubes and one neon low-tension tube had been installed experimentally in a housing hung centrally from a span wire and gave a pleasant light; the consumption was 1,400 W per lamp.

Mr. J. P. Blackmore's paper on public lighting in Bombay related to conditions that seemed strange to European eyes. The lamps were the property of the City, but lighting was carried out by contractors on a flat-rate basis. Of the 216 miles of lighted streets, 140 miles were illuminated by gas, sixty-five by electricity, and eleven by oil. Elaborate arrangements must be made to cope with the monsoon season and also with intercommunal riots.

A New Acoustic Noise Meter

A NUMBER of well-established methods of noise measurement are now available; these are usually either "objective," using a microphone to pick up the noise with an amplifier and meter, or "subjective," using the ear as the criterion, or of combinations of the two.

The objective methods as a class have the outstanding advantage of avoiding errors due to the personal factor, but introduce other errors of a more serious nature. The noise to be measured consists almost always of a number of different frequency components, and the measuring device adds these according to the square law. The ear, however, operates according to different laws depending on the magnitude and frequency spacings of the components, and the errors from this cause may rise to as much as 100 per cent. Then, again, the ear weights each frequency differently, and, moreover, for a given frequency the "weight" is a function of the sensation level of the component. Hence, even if the objective method includes a weighting network, this can only be adjusted for one particular level. The objective meter tends to be cumbersome and is inevitably expensive, as high-quality condenser or moving-coil microphones and amplifiers, having linear operating characteristics, must be used.

The acoustic noise meter

Aural Methods

Methods which make use of the ear give much more satisfactory results. The usual practice is to pass a standard reference tone, consisting either of a single frequency or a complex wave, into a telephone receiver through a calibrated volume control, the loudness of the reference tone being adjusted until it is either estimated to be as loud as the noise under measurement, or until it is just not masked by it, the setting of the volume control in each case being a measure of the intensity of the noise. In the former arrangement one ear hears the noise while the other hears the reference tone, the receiver being usually padded to exclude the noise; in the latter arrangement the receiver is held a fixed distance from the ear by an "off-set" device, so that the noise and reference tone are heard in the same ear. The disadvantage is that the variation in sensitivity of the ear from one observer to another is quite large for single frequencies, although the average sensitivity over a wide range of frequencies is much more constant; hence both with the equality and masking arrangement widely differing results may be obtained by different observers.

The objection to the single frequency is often avoided by the use of various warbler tones; in these a single-frequency component is caused to travel continuously up and down the scale, an equality or masking measurement being made in the usual way. Although simple in conception, the method is often difficult to realise in practice and is rarely used outside the laboratory. The advantages of a multi-frequency reference tone can, however, be retained by the use of a complex tone in which all the components throughout the frequency range are produced simultaneously. Such a tone can be produced by a buzzer or rotating commutator which gives a square-topped wave consisting of a fundamental and a series of harmonics.

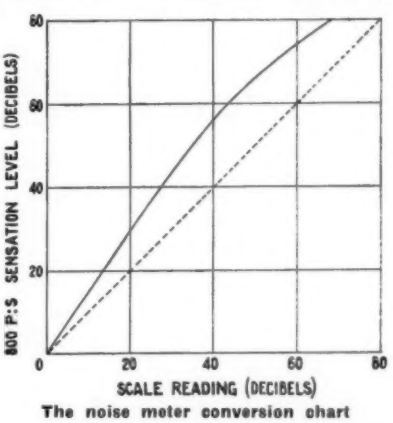
A reference tone of this kind fulfils the requirement that for satisfactory measurements it should contain components in the same frequency range as the acoustic noise to be measured, and since the components of the latter may occur anywhere in the audible range, the best general results are obtained by giving the reference tone a large number of approximately equal components throughout a wide range of frequencies. The harmonics in the square-topped wave, however, have amplitudes which are inversely proportional to their frequency, and as the response characteristic of the telephone receiver is also involved, an equalising network can be incorporated so that the acoustic pressure applied to the observer's ear is substantially constant over a wide range.

Using such a complex reference tone, there is little to choose between equality and masking measurements, excepting that the masking point is of greater interest as it is the masking effects which constitute the annoying feature of noise. The equality measurement has the merit of being a direct comparison, but it demands considerable experience in estimating equality to obtain consistent readings and is fatiguing if a large number of measurements are to be made. The masking measurement, however, is much simpler to use, the masking point being easily and quickly observed so that the results are much more consistent, but the readings do not directly give the level of the noise, as the reference tone level is necessarily less than that of the noise in order to be masked. This is immaterial where only relative loudness is required, but where noise measurements have to be expressed in terms of their level above threshold, use can be made of a chart prepared by plotting the masking and equality readings for the same noise and at various levels.

The use of a complex tone introduces a difficulty in that the intensity and distribution of the components are not specific in nature, so that standardisation would be difficult to achieve. It is, however, becoming generally recognised that the loudness of a complex sound can most conveniently be expressed in terms of the equivalent loudness of an 800 p:s tone, the loudness of the latter being expressed as so many decibels above threshold at that frequency. This, although a necessity to reach standardisation, reintroduces all the objections to single-frequency measurements. This dilemma can be avoided by using a complex tone for making measurements, and by using a chart for converting the masking readings into the equivalent 800 p:s sensation levels. This chart can be prepared by making simultaneous masking measurements with a complex tone using an "off-set" receiver, and equality measurements using an 800 p:s tone and normal receiver, at various noise intensities. The "off-set" receiver method using the masking point of an equalised complex tone then combines the chief advantages of other methods and avoids their individual limitations.

The "Standard" Meter

In the acoustic noise meter developed by Standard Telephones & Cables, Ltd., the complex tone employed is a flat-topped wave produced by a clockwork-driven commutator which runs for approximately five minutes; a single 1.5-volt dry cell is used, and a battery switch, rheostat, and milliammeter are provided. An equalising network is incorporated which comprises an inductance, condenser, and resistance, the values of which were found empirically from measurements of the acoustic pressure output from the type of receiver used when applied with current from the commutator. The attenuator controlling the loudness of the reference tone consists of a 0-30-db. attenuator dial having 2 db. steps, and two switches controlling additional 20-db. steps, giving a total masking range of 70 db., and an equivalent 800 p:s sensation level range of approximately 80 db. above threshold.



The noise meter conversion chart

The level of the reference tone is approximately at the threshold of hearing for normal observers when the full 70-db. attenuation is inserted, and the scales indicate directly the level above threshold. The set is housed in a case 9 in. by 6½ in. by 7¾ in. high, and the weight is 11¼ lb. Noise from all kinds of sources, such as gears, electric motors, and power transformers is easily measured by inexperienced operators.

The British Association

Proceedings at Leicester

THIS year's meeting of the British Association for the Advancement of Science opened at Leicester on Wednesday, when Sir Frederick Gowland Hopkins delivered his presidential address on "Some Chemical Aspects of Life." The sectional transactions started yesterday. The papers of chief interest to our readers will be those presented before Section G (Engineering) and Section A (Mathematical and Physical Sciences), but some of the other sections also will provide useful matter.

[*Elliott & Fry*
Mr. R. W. Allen, C.B.E., President of Section G—Engineering

The principal feature of Thursday was the address of Mr. R. W. Allen, as president of the Engineering Section, in which he gave "Some Experiences in Mechanical Engineering," explaining that the term covered electrical engineering activities also. Mr. Allen reviewed briefly some of the changes in engineering during the past fifty years, which have seen the introduction of the steam turbine, the oil-engine to drive electric generators, which now have an annual output totalling 200,000 million kWh, and the centrifugal pump. The pioneering labours of Parsons laid the foundations for turbine design. Steam turbines for marine use have been constructed in units developing 50,000 s.h.p. Large turbines now have a thermal efficiency of over 34 per cent. (10,000 B.th.u. per kWh). Turbines are in commission with individual ratings of 200,000 kW, but show little, if any, improvement in efficiency over 50,000-kW machines.

Dr. Rudolf Diesel obtained the patent for his engine forty-one years ago. The cycle relies for ignition on the temperature resulting from high compression of a charge of air (up to 500 lb. per sq. in.); the burning of the charge takes place at roughly constant pressure. The use of mechanical injection, due to Ackroyd Stuart, removes the disadvantages associated with high-pressure air (at least 1,000 lb. per sq. in.), and dispenses with the compressor drive, thus reducing overall length and weight and increasing thermal efficiency. Starting by compressed air is universal for large engines, but for tractor and smaller stationary sets electrical and mechanical methods are receiving increasing attention. The recent development of the high-speed engine with small size and low specific weight makes it particularly suitable for railway work, and for road work the heavy-oil engine has come to stay.

The centrifugal pump is cheaper and has lower maintenance costs than the plunger pump, while its constant-pressure delivery makes it peculiarly suitable for boiler feeding. A striking application is in the handling of coal and abrasive material.

The recently developed axial-flow type of pump enables higher speeds to be adopted when dealing with low heads, resulting in lower constructional and installation costs. In many parts of the world the striking results of irrigation have been achieved only through the use of modern pumping plant.

Science and Mechanisation

The substitution of science for rule-of-thumb methods during the past fifty years has revolutionised the construction and design of machinery. Another important influence in progress has been the adoption of repetition methods, involving standardisation and interchangeability of parts. At no previous time has mechanical (including electrical) development been so rapid.

Workshop training should be provided for three classes of student: (1) professional engineers intending to qualify ultimately for the higher branches, for whom a university course should be followed by three years in the different departments of an engineering firm without any attempt at early specialisation, (2) those going into the works from a public or secondary school, who would attend evening classes, while pursuing a three- or four-year course, to raise their education as nearly as possible to the level of the university student; and (3) craftsmen, recruited from boys leaving an elementary school at the age of fourteen or fifteen years, who, after a preliminary probationary period, are apprenticed for five years to some particular branch of the trade and should have opportunities of reaching the highest rung in the ladder.

Mr. Allen also pointed out that the gift of engineering to mankind must be increased leisure. We were now moving so quickly that it often seemed doubtful whether mankind could adapt itself to the rapidly changing conditions. It was as if conservative and unimaginative humanity, caught up by a sea of advancing and fast-accumulating knowledge, was being carried into unknown waters away from the lighthouses of past experience. Although history hardly dealt with discovery and invention, a time would come when the achievements of men and matters of the present day would be appraised at their full value.

On Thursday afternoon a visit to Daventry Broadcasting Station was arranged.

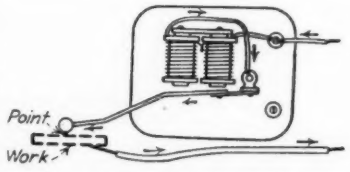
Television Developments

During the meeting, demonstrations are being given by research engineers of the Marconi Co. of the projection of television images on a screen 4 ft. square. For the first time an exhibition will be given of television by means of a directed light beam, which will be used as a link between the transmitter and receiver instead of the usual radio or wire link. The apparatus consists of a transmitter in which the electrical impulses corresponding to the television picture signals are converted into light impulses through the operation of a sodium tube mounted in a searchlight fitting and a new type of photo-cell receiver. The latter reconverts the modulated light impulses into terms of electric current, thus operating the television receiver in the ordinary way.

For to-day a paper we recommend for attention is that to be read by Mr. W. Wilson before the Engineering Section on "Testing Electrical Switch Equipment." Mr. Wilson will demonstrate the increasingly important part to be played by the kinema camera. "The Nature of Cosmic Rays," discussed by Professor E. Regener before the Mathematical and Physical Section, is an alternative; these rays have a practical bearing now owing to their influence in starting the discharge in hot-cathode lamps. A profitable occupation for this afternoon will be to accept the invitation of the British Thomson-Houston Co., Ltd., to visit its Rugby works.

A Simple Etching Tool

MR. L. KASPER, in the *Machinist*, shows how an electric etching tool can be made from a small bell supplied at 12 V from a battery or transformer. The vibrator contactor, the gong, and the wire connecting the vibrator support with the binding post are all removed, and the wire leaving the magnet coils is attached directly to the vibrator support. The striking ball of the vibrator is drilled and a pointed metal pin is inserted. One wire from the source of supply is attached to the binding post nearest to the magnets, and the other wire is held in contact with the work to be etched. To operate the tool, the bell box is grasped between the thumb and the index finger of the right hand, in much the same manner as in holding a pencil, and the point in the ball is guided over the work, the process being exactly as when writing with a pencil, though, of course, much slower and with a much lighter touch. When the pin in the ball is brought into contact with the work, the current passes through the magnet coils, the vibrator, and the work, and back through the wire in contact with the work to the source of supply. When the magnets act to attract the vibrator, the pin is lifted out of contact with the work, breaking the circuit. As the circuit is broken, an electric arc is formed between the pin and the work, the heat of the arc causing a series of small pit marks to be formed on the surface of the work. Although the marks are not very deep, they are quite distinct, and any etching done in this manner will be quite durable.



An electric bell used as an etching tool

There is also an alternative method. Instead of the short pin in the vibrator ball, the ball can be drilled through and a pin about an inch long can be inserted and locked by a set-screw. Thus the length of the contact point can be adjusted, making it possible to work in grooves or depressions, besides giving better visibility at the working point when following the lines.

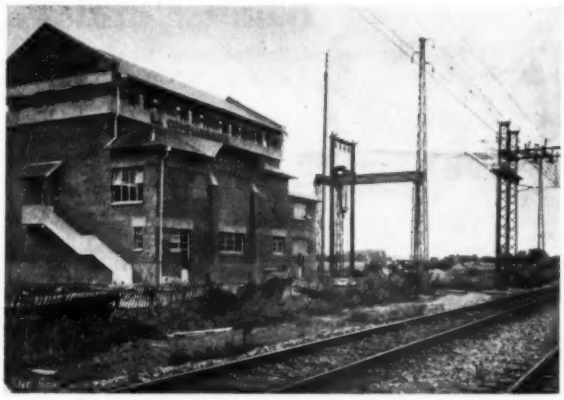
The Orleans-Tours Electrification

THE electrification of the Paris-Orleans railway line is making steady progress. This work was first undertaken in 1923, and when interrupted in 1926, owing to the financial situation of France at that time, the first section of the line from Paris to Vierzon had been completed. Now an important part of the second section has been finished, namely, that between Orleans and Tours. The section from Vierzon to Brive is expected to be completed by 1935.

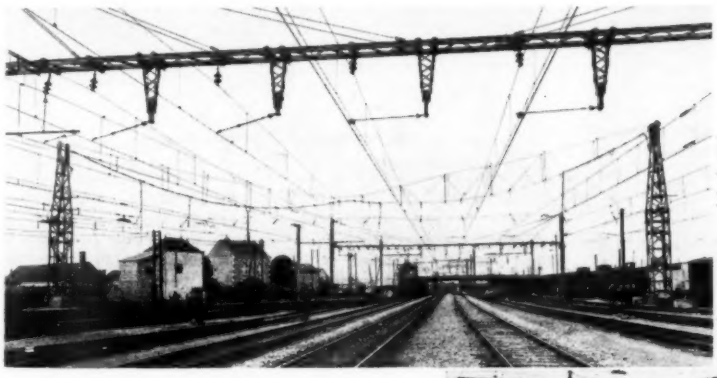
Two overhead 90-kV transmission lines feed the sub-stations of the Orleans-Tours section, each line being composed of three steel-aluminium conductors with a cross-section of 239 sq. mm. and 20.1 mm. in diameter, suspended by strings of six or seven insulators, each string being protected at the top and bottom by horns. The towers are 275 metres apart. The lowest of the conductors is about 90 metres from the ground. There is a galvanised steel cable of 60 sq. cm. cross-section along the tops of the pylons, forming an earth wire.

For the time being, power is drawn from the generating plant at Coindre, the only one belonging to the company which is in service at the moment. The plant is tied into the "centralising" station at Marèges by a 90-kV line and through a 90/220-kV transformer. The regular 220-kV line from Marèges to Paris is tapped at Chaigny, near Orleans, and tied in to the 90-kV lines which furnish the power for the Orleans-Tours railway line. The tapping of the Paris feeder will enable the plant at Eguzon, or even the plants in the region of Paris, to supply power in case of a breakdown at Coindre.

The power is distributed to the railway line by means of



La Commanderie sub-station



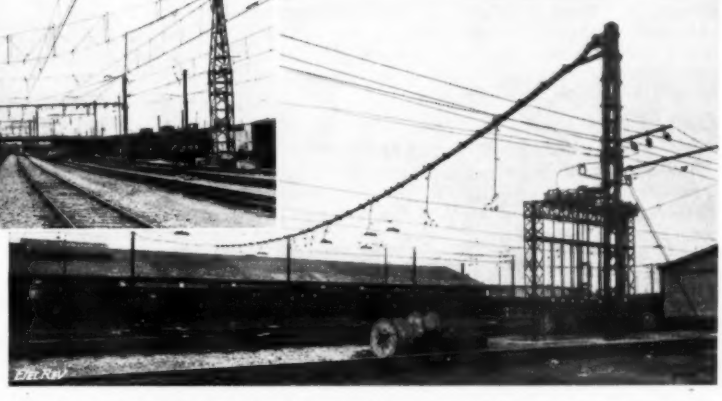
five new sub-stations at Les Courcelles, Les Gribonzy, Les Vallées, La Commanderie, Les Epines Fortes, and one already existing sub-station at Saran. They convert the 90-kV 50-cycle 3-phase a.c. to 1,500-V d.c. by means of two groups of 750-V machines in series. The 90-kV equipment is installed in the open air and is automatic.

The sub-station at Les Epines Fortes, near St. Pierre des Corps, at the extremity of the line, has an additional 90/10-kV transformer, which assures the lighting and power requirements of the stations of Tours and St. Pierre des Corps as well as the signals and automatic block system for the section of line from Tours to Orleans. An emergency motor-generator and a group of storage batteries in the sub-station permit operation for half an hour in case of a breakdown of the 90-kV transformers. The continuity of operation of the automatic block system and the signals is, moreover, assured by a duplicate installation at Saran.

As in the zone already electrified, the overhead-trolley lines consist of a bronze catenary of 116 sq. mm. cross-section from which is suspended an auxiliary electrolytic copper cable of 104 sq. mm. cross-section. From the latter are suspended two grooved contact wires of 107 sq. mm. cross-section, those for one track of hard-drawn electrolytic copper, and for the other track of cadmium bronze. The support posts are 63 metres apart, the two lines being independent and attached to separate towers. The track circuits are sectionalised by high-speed circuit breakers.

The trolley wires in the stations are of the simple tramway type which permits long spans, thus clearing the platforms and tracks of cumbersome towers.

At the time of the electrification of the section from Paris to Vierzon, eighty locomotives for the suburban service, 200 locomotives for passenger and goods traffic, and five high-speed test locomotives were ordered. After six years of service it appeared that the Brown-Boveri type 2D2 gave the best results. In view of the opening of the electrified line from Orleans to Tours, twenty-five new locomotives of this type have been ordered. The principal characteristics are: Overall length, 17m. 780; distance between front and back axle, 14m. 400; diameter of driving wheel, 1m. 750; and diameter of other wheels, 0m. 970. The total weight in running order is 136 metric tons. The maximum power is 3,740 h.p., and the running power 3,320 h.p.

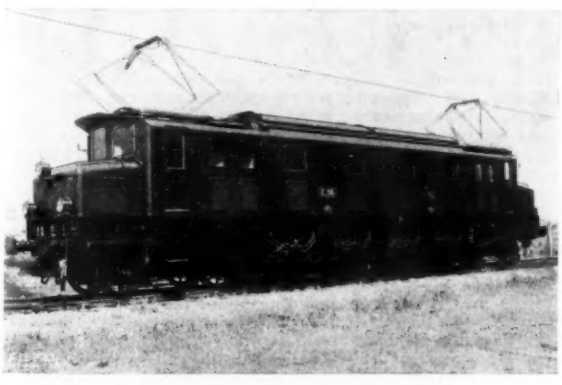


Left: A semi-rigid span at St. Pierre des Corps. Right: Suspensory system at the Tours station

The connection between the gear and driving wheels is established by connecting rods and toothed sectors on the Büchly system, used on the Swiss Federal Railways. These locomotives will include regenerative braking equipment.

The electrification of the Tours-Orleans line increases the number of kilometres of line and of single track of the Orleans Company respectively from 238 to 353 and from 970 to 1,285. The total annual traffic by electric traction which amounted in 1932 to about 5,000 million ton-kilometres will be augmented to about 6,400 millions. The consumption of energy measured at low voltage at the entrance to the sub-stations will rise from 115 to 143 million kWh, and the corresponding economy of coal will increase from 260,000 to 318,000 tons.

A picture of the outdoor equipment of one of the 90-kV sub-stations feeding this line appeared on page 243 of our issue of August 25th.



One of the Brown-Boveri locomotives

Bakers' and Confectioners' Plant

THE 37th International Exhibition of the Confectioners', Bakers' and Allied Trades at the Royal Agricultural Hall, Islington, N., began on Saturday last and will close to-day at 5 p.m. The most noticeable features of this show are, as usual, the baking ovens, which are displayed on nine stands by seven makers. The Artofex Engineering Works has two 6 by 4 ft. models (one single and one double deck) in the Gilbey Hall; Baker, Perkins, Ltd., a 7 by 5 ft. double-deck peel portable type; and Barron Pearson Engineering Co., Ltd., a confectioner's miniature oven.

The Bristol Steam Oven Works, Ltd., has come into the electrical field and is showing examples of its latest models; so has another Bristol steam-oven firm, Thomas Collins & Co., Ltd., with a single-deck "Electro-heat," to which a second deck can be readily added, and which embodies a new system of heat circulation within the baking chamber. A new model, the "Uni-heat" hot-air oven, has been introduced by the Dumbrill Plant & Engineering Co.

The General Electric Co., Ltd., is showing on its own stand three double-deck ovens—8 by 4 ft. (18 kW per deck), 3 by 3 ft. (7 kW per deck), and 24 by 18 in. (3 kW per deck), and also 3 by 3 ft. models on the stands of Criming, Ltd., and De Bryn, Ltd. Demonstrations are being given daily with one or other of the ovens and also a "Magnet" scone-plate, a robust piece of work, and with a doughnut cooker, which is a complementary appliance to the scone-plate. This company is also displaying a 10-gal. 1-kW cistern-type water-heater, with ball-valve and a Maas "Humidor" steam injector, another of which (6-gal. 2.3 kW) may be seen on the stand of L. J. P. Maas.

What struck us as being the most novel feature of the exhibition is the chocolate fork-type dry-heated dipper that has been developed by the G.E.C. for coating confection centres with chocolate. We believe it to be the first British machine of the kind. Its capacity is from 28 to 30 lb. and its dimensions are 23 by 17 by 9 in. The chocolate is contained in a removable pan supported in a legged outer container to the sides and bottom of which are fitted the 200-W heating element in a manner designed to ensure uniform heating. An automatic thermostat is fitted between the bottom of the container and the elements; this is adjustable by a brass knob on the exterior of the case, an engraved dial giving an indication of the temperature of the chocolate. Demonstrations are being given daily.

Motor-driven Appliances

The manufacturers whose names are given above also show a comprehensive array of mixers, kneaders, dividers, and other trade machinery most of which is designed for driving by individual motors as an integral part of the equipment. In addition to these C. O. Ericsson, the Hobart Manufacturing Co., Ltd., John Hunt (Bolton), Ltd., E. F. McCourt, the Morton Machine Co., and Read's Mixers & Oven Co., Ltd., all present good examples of electrical driving methods. Frigidaire, Ltd., display cold-storage cabinets especially designed for bakers.

Electric delivery trucks are shown on the stands of Gardner

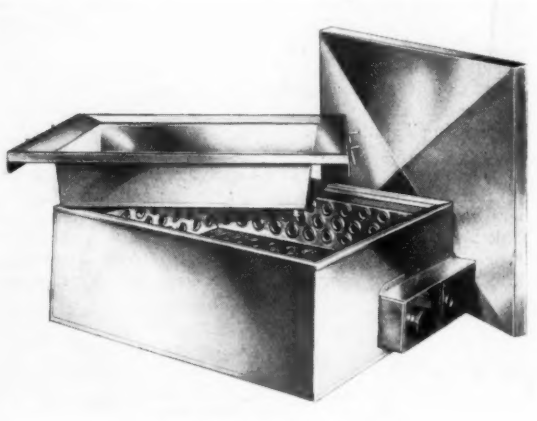
The G.E.C. stand at the Agricultural Hall

Freezers, Ltd., and A. E. Morrison & Son, Ltd. In the former case the "Gordon" truck is a product of the Metropolitan-Vickers Electrical Co., Ltd., and is propelled by Ediswan batteries. It is a three-wheel 10- to 12-cwt. vehicle capable of travelling at any speed between 4 and 16 m.p.h. within a range of forty miles with a 60-V 180 A-h battery. More cells can be fitted to give speeds up to 30 m.p.h. The Morrison vehicle is a four-wheeler which can do 15 to 20 m.p.h. with a 35- to 60-mile working range. It is fitted with an automatic valve battery charger. The operating costs are said to be 4d. for 280 miles. One complete vehicle and a chassis, both of 12-cwt. capacity, are exhibited on this company's stand; examples of 30-cwt. and 12-cwt. vans produced by Messrs. Morrison may be seen outside the exhibition buildings.

Chocolate and Confectionery Exhibition

The main interest for our readers of the sixth Chocolate and Confectionery Exhibition, held at Olympia from August 25th to September 7th, lies first in the use made of electricity for displaying goods to the best advantage, and, secondly, in the extent to which the special machinery shown incorporates electric motors as an integral part.

In the former, all the well-known firms and many of the smaller also had simple and effective lighting systems on the best modern lines. A novel note was introduced on the stand of the Squirrel Chocolate & Confectionery Co., Ltd., which incorporated seven miniature shop-window fronts. Two of



A dry-heated chocolate dipper

the displays consisted of a number of shaped flat cut-outs to form backgrounds on which the shadows of chocolate boxes are thrown. Three-colour window lighting is regulated by an automatic controller to give a continuous change of colour in each shadowed portion of cut-out. Another window shows a miniature landscape decorated with a background of clouds of varying colours. The lighting equipment was provided by Holophane, Ltd.

Manufacturers of chocolate, etc., machinery with an electric drive incorporated are Baker, Perkins, Ltd., Hansella, Ltd., R. S. Murray & Co., Ltd., and Rose Bros. (Gainsborough), Ltd.

New Rubber-insulated Cables

THREE new types of rubber-insulated cable, insulated with heat-, corona-, and moisture-resisting compounds, have been announced by the General Electric Co. of New York.

Rubber insulation designated as "Type GE-R359" is designed to operate at a maximum temperature not exceeding 75 deg. C. It is recommended for cases in which a cable is required to be insulated with a compound which will stand much higher temperatures than the standard grade of rubber compounds previously available. There are certain requirements calling for a cable insulated to withstand high operating temperatures of the copper conductor, with the cable flexible, waterproof, and having a non-metallic finish. Varnished cambric and paper insulated cables will run at a higher copper temperature than standard rubber compound insulations without deteriorating the insulation; but paper and varnished cambric insulation are not waterproof unless furnished with a metallic sheath, which results in a cable which is not flexible. For such installations the new heat-resisting rubber compound is particularly adapted.

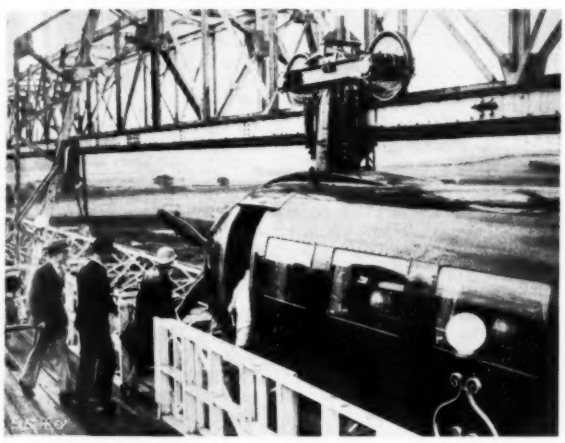
The new "Type GE-R348" moisture-resisting compound is designed for use on cables which must operate in wet situations. It is particularly adapted for non-leaded submarine cables. This rubber compound is not corona-resisting, so that for higher voltages it is necessary to apply a shielding tape. The third new compound, "Type GE-R351," is used to form the entire insulation over the conductor, since it has both high dielectric and corona-resistant properties. Specific applications for cable insulated with this compound include braided cable in wet ducts under alternate wet and dry conditions, or where the cable is subjected to external heat; primary networks where leaded cables are not desirable; apparatus leads for generators and for runs between transformers; switchgear, circuit breakers, and similar apparatus; where braided cables are installed in metallic ducts, especially with sharp bends; where cable is attached to uninsulated clamps, and sharp points adjacent to the cable would permit electrical discharge; on bridges where lead-sheath cables are not applicable on account of vibration; and in cases where leaded cable cannot be used and it is desired to terminate cable without potheads.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Unprotected Service Connections

Accompanying the description of the all-electric flats on page 212 of your issue of August 18th is a photograph of one of the service connections. I have studied this with some interest as it appears that the wiring is brought from the conduit to the meter without protection beyond some tape. Supply undertakings have for years continued to spoil otherwise efficient installations by long loops of unprotected wiring



The "Railplane" about to commence a trial run. (See page 333)

to the meters, but at the same time refused to connect installations which did not comply with the I.E.E. wiring rules. (Unprotected wiring where liable to mechanical damage is excluded by Clause 87.)

It may be said that the service connections are normally housed where they will not be interfered with, but in a living-room they are quite likely sooner or later to be used as a support for pictures, etc. I have frequently seen lead-covered wiring used in this way, but how is the layman (or laywoman) to distinguish between them? I have recently seen two excellent examples—one where unprotected v.i.r. emerged from unbushed conduit and was kept close to the wall by a door which forced the wiring on to the sharp edge of the conduit, and the other where there were festoons of unprotected v.i.r. to a number of services in a lavatory, and close to the water piping. Can we not have efficient service connections? Our gas rivals know how to arrange them!

August 30th. STROBOS.

Extraction Turbines

I was interested in your remarks on the extraction turbine in your issue of August 25th, but doubt whether your solution would be applicable to other than a few isolated cases, and even then might be a fruitful cause of litigation. To my mind a better method would be for a supply authority to undertake the supply of *all* forms of energy—electrical, mechanical, chemical and thermal. Such an authority would erect a super-station in a purely industrial area, *e.g.*, Trafford Park, Manchester, and invite industries which required low-grade heat (or other services which are not suitable for long-distance transmission) to settle in the vicinity.

The following are some of the advantages of my solution as compared with yours: The well-known advantages of large-scale generation; a more equable demand; cheaper loan money (a statutory authority can raise loans on better terms than private manufacturers); more efficient use of technical improvements, *e.g.*, mercury boilers, and diphenyl-oxide heat exchangers; the sale or exchange of waste products, *e.g.*, chemically foul water, hot air, and chemical refuse; and the economical employment of a highly trained staff.

I will admit that my suggestion could not be readily put into effect, but anything less can only be of a transient nature, as it is not a final and full solution. LEONARD BRADBURN.

Macclesfield, *August 29th.*

An Alternative Severn Scheme

Your note on the above raises the interesting point of the utilisation of the base-load stations in preference to peak-load stations. Naturally a full discussion of the whole problem would take up far more space than any paper, lay or technical, could give to it. I had not overlooked your point, but I believe that the base-load stations of the grid are already working at a load factor in the neighbourhood of 80 per cent. Certainly it would pay to bring them up to as near 100 per cent. as might be practicable; but even so the pumping load would fall mainly on the less efficient stations. But are the latter as bad as you would seem to imply? A very few years ago they were the last word in steam plant, and the best of them can only be a fraction below the worst of the base-load plants.

I should like to add that several smaller storages would be preferable to one huge one; a 200-ft. dam storing 17 million kWh would not only be very costly, but would create a difficult problem in transmission to and from the grid. Several 20,000-kW storage plants in different areas would be simpler and better; but water storage in this form seems anyhow to be the best solution of the load-factor problem. J. W. MEARES.

Chichester, *September 1st.*

Neon Warning Lights

The recent fatalities among experienced engineers while working in the proximity of super-tension switchgear show that even the most careful of men are liable to momentary lapses of memory regarding the live bars in another section when jobs have to be done without isolating them.

I would suggest that busbar chambers be fitted with neon tubes energised from the bar itself or placed near it. The well-known colour of the discharge should be an ample reminder, especially in a dark cell or chamber, and the requisite phase colours could be used according to the filling of the tubes. No potential transformers would be necessary, and the cost of installation should not be prohibitive. This would be especially useful when operating outdoor sub-stations in the dark, and provide a check on all switching operations.

Edgware, *August 31st.* T. H. GREEN.

Round or Flat Pins?

I am very interested in the correspondence now proceeding on the question of plugs and sockets and would like to give my views on the matter. In the first place I think that the point which Mr. Willis is trying to make is that if the heavy pressure now being brought to bear on responsible authorities to make the B.S. round pin plug compulsory is successful, a very retrograde step will have been taken and progress will be seriously retarded if not atrophied.

Flat pin plugs have been used by my undertaking in thousands, with unfailingly good results; in fact the only complete system of domestic plugs which covers the range of modern

This building, at Cobham, on the Portsmouth road, one of the few surviving telegraph towers from which notable public events or warnings used to be signalled, now has a grid tower as a neighbour

domestic apparatus has flat pins, but surely from these facts it cannot be argued that round pins should be abolished! Yet from the round-pin standpoint Messrs. Tucker & Arnold are condemning the flat pin plug on just as flimsy grounds. The

reputable makers of plugs in this country can be counted on one hand, and Mr. Arnold's bogy of multiplication of stocks is pure exaggeration.

I can vouch for the statement made by Mr. Dean that six typical examples of six makers' standard plugs are not interchangeable in the true sense of the word; in fact, in twenty-four plugs and sockets of one maker I have found tight and slack contacts. Interchangeability can only be a relative term, and, as Mr. Willis states, if this is secured in one house all that is necessary has been achieved. In this connection Mr. Arnold must admit that his kettle example is a mistake, as all apparatus to my knowledge is supplied without plugs unless they are specially ordered.

In conclusion, I would suggest that far greater service would be done to the industry if each manufacturer, instead of striving for universal interchangeability, would concentrate on good contact, including that of the earth pins, and on ease of fixing, cord grip, and other important details. The law of the survival of the fittest will then weed out all undesirable types of plugs. F. H. RUDD.

Rochdale, *August 30th.*

Mr. Arnold's letter in your issue of August 25th assumes that I am not aware of the requirements embodied in the latest Specification No. 372, Clause 14, and I can only reply that this assumption is rather discourteous. Not only am I fully aware of the requirements, but I have made several purchases of plugs and sockets which are made to this Specification by various manufacturers, and they entirely fail to pass the interchangeability test.

Moreover, I should not have made the statement that plugs and sockets made to the Specification by different manufacturers were not interchangeable if I had not satisfied myself by most careful examination that this claim of interchangeability was a fallacy.

R. W. WILLIS,
Engineer and Manager,
Cheadle and Gatley
Cheadle, *August 31st.* U.D.C. Electricity Department.

What Shall I Have to Pay?

As suggested in your leaderette of August 25th, I give figures of electricity used in my small semi-detached house, comprising two living rooms, kitchen, three bedrooms, bathroom and lavatory. Gas is used for the wash copper only (provided with the house) and coal for one fire during the coldest part of winter. My wife, baby and myself only are in the house.

We have two-way switching on two 15-A power points for the fire in dining room and a boiling ring in the kitchen, controllable from our bedroom at will.

When we moved in 800 W of lamps and 12 kW of apparatus were installed, but this has gradually been increased. There are now thirteen 15-A separately fused switch-plugs and twenty-two 5-A sockets.

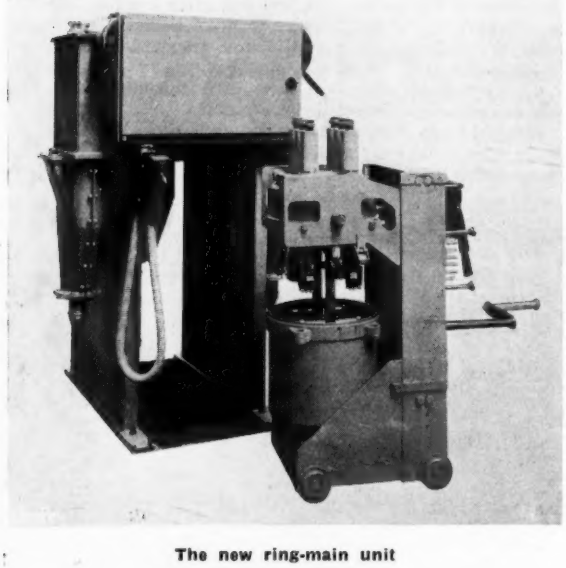
The heavier apparatus in the installation consists of a 7-kW cooker, a 4-kW boiler (old without thermostat), a 3-kW instantaneous water-heater, one 3-kW, four 2-kW, one 1-kW and one ½-kW fires, and also a 1½-kW thermostatically controlled fire in the garage. There are also twenty-one appliances with a loading of 1-kW or less with a combined rating of about 8 kW and nearly 2½ kW of lighting, making a total of 38½ kW.

The kWh used annually since the beginning of 1927 have been 4,986, 5,159, 4,969, 5,331, 8,520, 10,090, and for the first six months of the current year 4,095. The tariff is 12½ per cent. of the rateable value plus ¾d. per kWh in winter and ¼d. in summer. The average quarterly bill has been £4 5s.

Watford, *September 4th.* R. GIBBON.

A New Ring-main Unit

ON small ring mains and in the case of intermediate tappings between fully protected sub-stations on larger ring-main systems, the switchgear employed may comprise non-automatic equipment for the purpose of sectionalising the ring and automatic gear for controlling the "tee off"



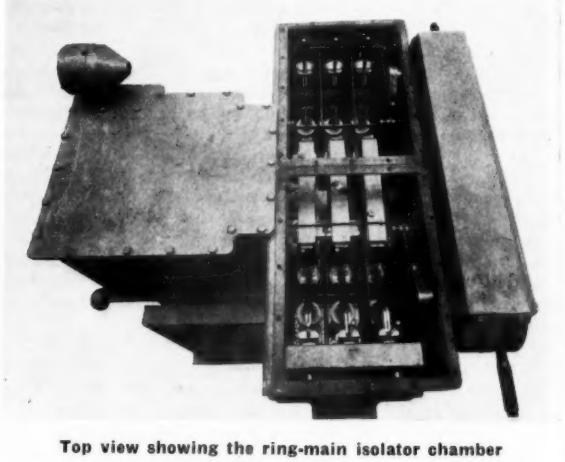
The new ring-main unit

feeders. The provision of testing terminals on ring-main feeder cables contributes to ease of maintenance, and to ensure safety it is desirable to provide an interlock such that access to the testing terminals cannot be obtained until the line has first been connected to earth.

In the case of compound-filled metalclad unit switchgear skeleton units are frequently installed as non-automatic ring-main feeders; access to the line for testing purposes is in these cases obtained *via* the main isolating plugs. Generally no added precautions are taken to ensure the safety of operators. Unless it is desired to convert the skeleton equipments into automatic circuit breaker equipments with ring-main protection at a later date the use of this apparatus has the double disadvantage of expense and unnecessary bulk.

The illustrations show a compound and oil filled metalclad ring-main unit, designated "Type VSB" which has been developed by Ferguson, Pailin, Ltd., Higher Openshaw, Manchester, to meet these conditions, the unit comprising the whole of the high-voltage switchgear required for a ring-main station having one "tee off" feeder. This equipment is a combination of a metalclad unit incorporating a vertically isolated oil circuit breaker and fully interlocked oil-immersed isolating switches. The breaker is of the "Type BR" round tank design, and the isolators are lever operated, having three positions, "On," "Off," and "Earth." The operating lever works through a gate which prevents inadvertent earthing of the cable, as two distinctly separate movements must be made when passing from the "On" to the "Earth" position. An interlock is provided, rendering it impossible to obtain access to the cable-testing terminals until the cable has been connected to earth. Flicker blades, which are easily replaceable in the event of excessive burning, are provided on the isolating switches.

The cable boxes are well clear of the floor, affording easy jointing and neat cable work. The usual current and potential transformers can be accommodated to suit customers' requirements. The pedestals are fabricated by welding steel plate, which serves also to form an enclosure for the circuit



Top view showing the ring-main isolator chamber

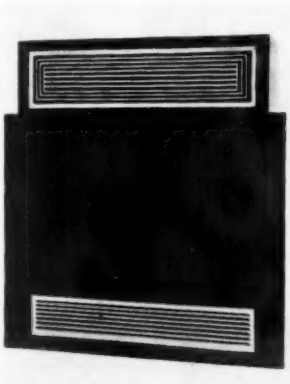
breaker. All chambers are compound or oil filled, effectively safeguarding against dust, vermin, or moisture. The unit is compact, economical in floor space, and easy to transport and erect.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Convection Heating System

The "Thermovent" is a new type of convection heating apparatus developed by THERMOVENT, LTD., 1039, Argyle Street, Glasgow.



A "Thermovent"

It consists of a system of heat-insulated air ducts, the centre one containing special heating elements designed to convert, to a maximum degree, radiant heat into convected heat, so circulating warm, fresh air throughout the room.

The whole is surrounded by an outer casing of wood, steel, or porcelain with bottom and top grilles for the cold-air inlet and warm-air outlet. Models in varying designs are available, all of which are in attractive styles.

A Moulded Ceiling Rose

A moulded ceiling rose with an improved interior with some novel features has recently been introduced by the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2.

The interior is specially recessed to ensure easy wiring with either surface or back entry. Fixing holes are spaced at 2-in. centres to fit B.S. conduit boxes, and alternative mountings, either on wood blocks or direct on ceilings are provided for. Solid terminal blocks are liberally designed for current carrying.

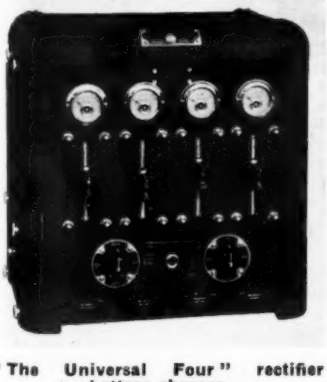
The "Ediswan" moulded ceiling rose

Flexible wires can be easily and rapidly connected by side-entry through the terminal blocks, and securely gripped by an insulated screw without injury to the fabric, taking the entire strain off the conductors. The rose is 2½-in. in diameter in both two- and three-way models, brown or cream. A two-plate brown model costs 6s. 4d. per dozen.

Rectifier Battery Chargers

There are twelve distinct models in a new range of valve rectifier battery chargers introduced by Messrs. NEWTONS OF TAUNTON, LTD., 319, Regent Street, W.1. They all have rounded corners and a domed top, and are of attractive appearance, all metal fittings being chromium plated and the complete unit having a crystalline finish throughout. A removable side plate and top provide maximum accessibility.

Double overload protection is afforded by a visibly calibrated glass fuse and an additional automatic device. Dual-acting spring-controlled resistances each consist of two distinct sliders with spring-loaded contacts operating in parallel. The smooth operation of these enables the charging rate to be adjusted to a fraction of an ampère. The q.m. and b. rotary selector switches have specially calibrated easy-to-read indicator plates.



"The Universal Four" rectifier battery charger

Two "Junior" models (£7 10s. and £9) specially designed for the small garage, have maximum d.c. outputs of 6 A, 15 V, and 6 A, 30 V, provision for one charging circuit each, and full-load consumptions of 150 W and 350 W.

Larger models of similar type are the "Service Three," the "Service Four," and the "Universal Four."

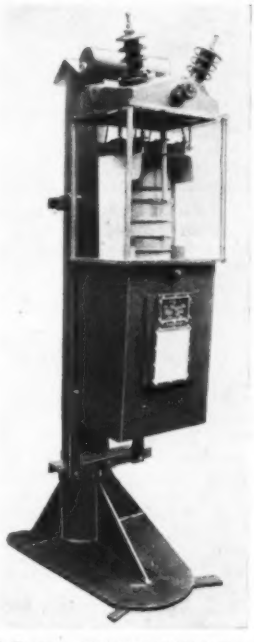
The "Utility Three," "Universal Three-Six" and "Universal Three-Ten" models have maximum outputs of 6 A at 50 V, 6 A at 72 V, and 10 A at 72 V, and inputs of 580 W, 720 W and 1,000 W. There are also special one-circuit chargers for h.t. batteries, a large-capacity charger for car starter batteries, and the "Charging Station," equipment (£54) which provides seven circuits with charging rates varying from 0.3 A at 150 V or 300 V to 10 A at up to 72 V, and has an input load of 1,900 W.

Parsons Pole Transformers

The accompanying illustration shows an example of a range of pole transformers introduced by MESSRS. C. A. PARSONS & CO., LTD., Heaton Works, Newcastle-on-Tyne, for rural electrification schemes.

They are made for pressures up to 33 kV and for outputs of from 10 kVA to 50 kVA, and are contained in weatherproof tanks. All the joints are oil-tight, and a conservator vessel is provided as a standard fitting.

Tapping switches are fitted for ratio adjustment when required, and low iron losses and good inherent regulation are features of merit.



A Parsons 25-kVA, 11,000/460-V pole transformer

An Improved Pole-finder

MESSRS. R. C. WILSON ELECTRIC, LTD., 51, Whitcomb Street, Leicester Square, W.C.2, are now marketing an improved model of their "Instant" pole-finder. Metal caps are now provided at either end, and the price has been reduced to 4s.

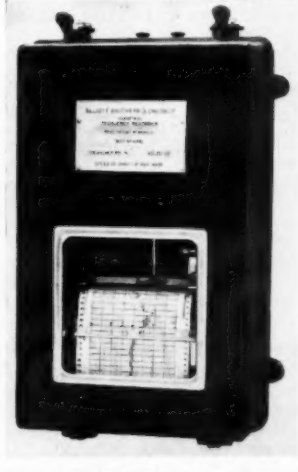
The pole-finder consists of a stout glass tube, hermetically sealed at both ends and embedded in black insulating material. The tube contains an electrically sensitive colourless liquid in which are immersed two brightly polished points, made from a non-oxidisable metal.

When the instrument is connected in circuit the negative point turns purple, and on a.c. systems both points become purple. The colouring is easily removed by allowing the air bubble inside the liquid to pass over the points.

A Frequency Recorder

A frequency recorder, embodying the Shotter patent, recently introduced by MESSRS. ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13, is of the "Extenscale" type and arranged for switchboard mounting.

It is of the induction pattern, employing the principle of differential resonant circuits in the working elements, and by a special design of movement very high working forces enable direct marking for the pen operation, thus avoiding relays and other secondary mechanism. The quick-acting, sensitive, movement is independent of wave form and temperature variations, and the power consumption is only about 20 VA at 220 V, 50 cycles, 50 per cent. p.f. Each division of the chart (3.75 in. wide) is equivalent to 0.05 cycle at 50 cycles, and variations of 0.025 cycle are readily discernible.



An "Extenscale" induction direct-marking frequency recorder

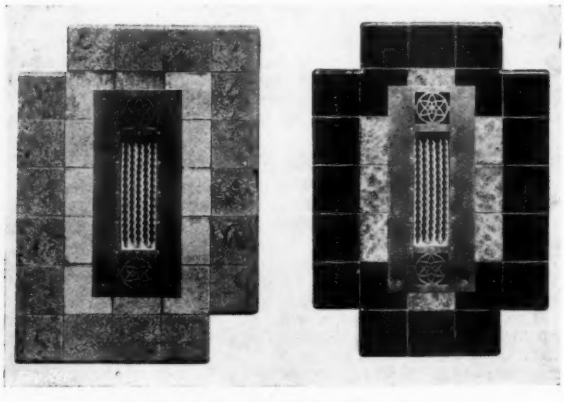
The chart, which has straight-line co-ordinates, is driven by an accurate self-contained clock mechanism, and the clock may be either spring or synchronous-motor driven. The chart speed recommended is 3 in. per hour, and the used chart is automatically rewound, but it can be torn off at any desired interval. The standard instrument is made for 110 V, 220 V, and 440 V, a 110-V model costing £73 15s.

D

Wall Panel Fires

The latest development of the BELL FIREPLACE CO., Kingswell Works, Northampton, is a wall panel fire which is available in a wide range of colours and designs.

The fire incorporates a 1-kW bar element fitted into a



Two of the Bell wall panel fires

chromium-plated frame having air vents at the top and bottom to promote convection; a tiled slab forms a pleasing setting. The whole equipment is supplied as a complete unit, and can be fitted on any flat wall, flush or projecting.

A Bell Transformer

A new "Magnet" bell transformer produced by SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Silk Street, Salford, has a high winding impedance to prevent burn-out in the event of the secondary winding becoming short-circuited. Provided that the transformer is not screened, so that heat can escape, no damage will result from a fault on the secondary winding. The energy loss for a year with the secondary open-circuited is less than 1 kWh.

A "Magnet" bell transformer

The base, which carries the terminals, and the cover are of brown moulded "Bakelite," and there is an externally visible earthing terminal. Working voltages of 4, 8, and 12 are provided for.

A Simple Immersion Thermostat

The new "Satchwell" type "H" immersion thermostat introduced by the RHEOSTATIC CO., LTD., Slough, Bucks, is a reliable low-priced thermostat for controlling the smaller sizes of water heaters. It is very simple and robust, and no mercury tubes or delicate mechanisms are used.

The standard temperature setting is 180 deg. F., but other settings are available. Regulation is given within about plus or minus 10 deg. F. Neither the setting nor the regulation is affected by the angle of mounting.

The unit is supplied in a flanged pocket suitable for sweating into the water heater, the pocket enclosing the entire mechanism. Heavy-gauge pockets suitable for high pressures can be supplied. Its capacity is 3 A at 250 V a.c.; 6 A at 110 V a.c.; or 0.1 A at 250 V d.c.

The "Satchwell" type "H" immersion thermostat

Domestic Immersion Heaters

Outstanding features of a range of immersion heaters recently marketed by the MANOR ELECTRIC OVEN & FIRE CO., 7, Sutton Street, Charing Cross Road, W.1, are: The elements are withdrawable without breaking the water joint; there is provision for fixing a thermostat on the same flange; and no fixing bolts or screws project through into the water compartment, thus rendering water leakage along the fixing screws impossible. The last mentioned feature is rendered possible by projections on the inside flange providing blind tapped holes which receive the fixing screws from the outside.

The complete equipment consists of special double section tinned-copper tubing brazed into the end plate, a spun brass cover, the elements, inside and outside flanges, the packing joint and fixing screws. The 1-kW, 2-kW and 3-kW sizes cost 26s., 35s., and 45s., respectively. Models are also supplied without the thermostat fitting.

Portable Amplifiers

Two new portable, two-stage amplifiers are being introduced by Messrs. HEAYBERD & CO., 10, Finsbury Street, London, E.C.2. They have loadings of 5 and 10 W, and are suitable for radio pick-up, or for the amplification of speech in small halls.

They are very compact and each is fitted with a comfortable carrying handle. The controls, terminals, meter, mains input socket and switch are mounted on a polished "Bakelite" panel, and a pilot lamp remains illuminated while the equipment is connected to the supply. They are priced at £19 10s. and £23 5s.

Two transformers for Westinghouse "H.T.12" rectifiers, with outputs of 25 mA at 175 V and 30 mA at 200 V, and 25 mA at 175 V and 30 mA at 200 V are also recent productions of this company, while the "AO2" and "AO3" battery chargers have been improved.

A Heayberd portable amplifier

A Breakfast Cooker

In introducing their new "Belling Junior" cooker, MESSRS. BELLING & CO., Bridge Works, Southburn Road, Enfield, Middlesex, stress the fact that such a cooker provides an excellent means of introducing electric cooking into the home.

The "Belling Junior" cooker

The grill chamber is large enough to take a chicken, and the drop-down door renders it an effective miniature oven. There is three-heat control for the 8¼-in. square, 2,000-W boiler-griller. The overall dimensions are 13 in. wide, 15 in. deep, and 8¼ in. high, and the equipment includes a grill pan and grid, a deflector plate and handle, and two yards of flexible cable.

The construction provides a cast-iron hob with a sheet-steel body, and the finishes are grey mottled vitreous enamel for the hob and door and heat-resisting aluminium colour for the body. The complete outfit is sold at 45s.

A Conduit-entry Switch-fuse

The "Memette" now has a younger brother, for the latest development of the MIDLAND ELECTRIC MANUFACTURING CO., LTD., Barford Street, Birmingham, is the "Memette for Conduit," which is similar in most respects to the standard equipment, but has conduit-entry holes, to comply with H.O. regulations for conduit installations, at the top and bottom.

Ample wiring space is a feature of this 15-A, 250-V unit, which measures 7 in. by 3 in. by 2.5 in., and costs 5s. 8d.

Shockproof Lampholders

MODERN POWER CONTROL, LTD., 102, Shoe Lane, London, E.C.4, has introduced an anti-vibratory lampholder made of "Bakelite," and consisting of a cup-shaped base in which are mounted the connecting terminals and the copper stampings for suspending the bayonet socket portion through the centre.

The lamp vibrates on the suspension stampings, and a feature of the holder is that the connecting wires do not vibrate also, but are rigid on the fixed portion of the base.

A back view of the anti-vibratory lampholder

The base has elongated holes for fixing to any signal lamp box, or conduit box, with suitable centres, and the lampholder can be mounted direct on to or into any suitable iron box or signal lamp, thus being adaptable for outside or inside use.

Electricity Supply Costing. By H. Southall

Opportunities arising on the distribution side

THE primary object of costing is to obtain knowledge which enables an executive to locate waste and extravagance, and many tangible benefits can be gained by the introduction of accurate costing systems in electricity supply undertakings.

All undertakings which still generate can usually produce an accurate weekly statement of generation costs, and, in some instances, rivalry created by published records has caused costing to be carried out by meticulous methods. Those who have had experience in such work can appreciate the importance of generation costs, and the ease with which it is possible to assign an increase under one heading or another to some specific cause. Very soon the majority of undertakings will be able to ascertain the cost per kWh at the bus-bars, within fine limits, by dividing the Central Board account by the number of kWh purchased, and no better use can be made of the redundant costing organisation than by transferring its energy to the distribution and sales sections.

Nowadays the annual expenditure on these two sections is considerable; in some undertakings it easily exceeds the amount spent formerly on generation. It is obvious, therefore, that a reduction of a single point in distribution costs per kWh sold now is of greater importance than those single-point reductions which were so eagerly sought after when the industry was adolescent. There is scope for personal achievement in efficient working on the distribution side, but the efforts of power station officials can be assisted or retarded by the efficiency or lack of efficiency of the plant they use. Distribution costs are at the mercy of two highly essential factors—organisation and supervision.

Where Costing is Needed

Throughout almost every industry there are repetitive processes and services, each possessing an economic cost level, and in all cases where the industry is subjected to the rigours of competition infinite pains are taken to ascertain such levels. Whenever expenditure exceeds this point there must be a cause; if the cause is unavoidable the management gets only the satisfaction of knowing what it is, but if it is preventable then action is taken to restore economic working.

Usually some form of costing exists in every municipal undertaking for the purpose of extracting the necessary data to accompany applications for loan sanctions to the Electricity Commissioners for such purposes as mains and services. By a slight elaboration of even the crudest system the economic cost levels of new mains, per yard, of the commoner sizes of cables can be obtained, and high costs can be noted for investigation. Service costs also have an economic cost level, allowance being made for the length of run and the size of the cable. It is futile to expect two services, even of identical length, to cost precisely the same amount, but experience shows that the constancy of service costs is quite near enough to cause abnormal cases to proclaim themselves.

Reinstatement charges on mains and services present a problem in themselves, but with co-operation and goodwill between the supply undertaking and the road authority exactitude in costing is not impossible. Judging from various reports, something like half a million meters are fixed annually throughout the country; here is a service with an economic cost level—what is it?

Cooker, wash-boiler and water-heating installations are being carried out in thousands; all have their economic cost levels. When it is realised that the economic rental of a cooker, excluding allowance for maintenance, based on loan charges over seven years, works out at roughly 10d. per quarter for each £ of capital cost, the economic cost level of installation is worth discovering. Let the question be asked then, what does it cost to install a cooker? Can the cost be lowered? If a negative answer follows the first question the odds are on the truthful answer to the second being in the affirmative.

There are so many complexities in the distributive and selling sections of the supply industry that perfection in organisation is difficult to achieve. Where efficient organisation exists sound costing systems must have preceded it, and they are probably doing much towards maintaining that which they have helped to create.

Some Applications

So far as this article is concerned, costing may be divided into two classes: single job costs and dissection of cost accounts. No simpler method of arranging job costing can be devised than by issuing an order or docket with a distinct number for each job. All materials from stores, wages expended, and direct payments made can be collated easily by means of a number, the work of the stocks, wages, purchases, and costs clerks being suitably co-ordinated.

The preparation of a cost statement calls for some initiative, and an astute costs clerk can soon acquire the method of setting out his statements in a readable manner. The cost accounts kept in undertakings can vary but little; the maintenance of mains and services account, for instance, is one which is common to all. This account lends itself aptly for the purpose, and may be analysed on lines such as: (a) salaries paid to officials; (b) wages of foremen and inspectors; (c) cost of repairing cable faults; (d) service maintenance and repairs; (e) transport; (f) maintenance of joint and disconnecting boxes and pits.

The analysis can be made simply or elaborately, according to local needs, and a statement of cost compiled on the above lines is much more illuminating and helpful than one massed total. Should it be found necessary to re-lay a long length of main, or carry out any large non-recurring jobs, a distinct cost may be extracted with advantage; when such items are included without being noted the cost statement is thrown out of balance.

It is financially unsound to expend money in large amounts without keeping track of it and ascertaining whether full value is being obtained from the expenditure. Economy can be effected by good costing systems, and a saving of £1,000 per annum on maintenance or other revenue accounts transferred to, and utilised in, a hired apparatus depreciation account can benefit a small undertaking considerably.

Year by year undertakings continue to develop, so do many gas undertakings. Competition is growing more fierce, reductions in costs are desirable now; eventually they will prove imperative.

The German Electrical Industry

A STATEMENT regarding the position of the electrical industry in Germany is made by Mr. J. W. F. Thelwall, Commercial Counsellor to H.M. Embassy at Berlin, in a report issued by the Department of Overseas Trade on the economic conditions in that country (H.M. Stationery Office, 4s 6d.).

Mr. Thelwall says that, with the exception of the radio branch, the industry passed through another serious depression in 1932, and this was reflected in the balance sheets of the principal companies. The home market suffered owing to the drastic reduction in public contracts. Exports of electrical machines dropped from Rm.89 million in 1931 to Rm.72 million last year, and of other electrical products from Rm.400 million to Rm.251 million. For the first four months of 1933, foreign sales of electrical machines and other electrical products amounted to Rm.10 million and Rm.59 million respectively, compared with Rm.28 million and Rm.92 million for the corresponding period of 1932. Exports of electrical products to the United Kingdom declined from Rm.11 million in 1931 to Rm.3 million in 1932.

Sales of radio manufactures in the past year were stated to be not much below those of 1931. The effect of the extension of German broadcasting stations compensated to some extent for the general loss in public purchasing power. An inquiry carried out by the Market Research Board revealed the fact that the radio turnover in Germany during 1931 was between Rm.200 and Rm.250 million, or about 1 per cent. of all retail sales.

Radio exports declined from Rm.78 million in 1931 to Rm.44 million in 1932, the corresponding weights being 8,100 and 4,900 tons respectively. Sales to the United Kingdom dropped from Rm.12 million to Rm.1.5 million, and there were heavy decreases in exports to Scandinavia, Czechoslovakia, Austria and Italy, while the Swiss market improved and exports to France were practically maintained. The German radio industry was very quiet in the first quarter of 1933 and the degree of employment was somewhat lower than a year ago.

Germany's general economic development during 1932 was unsatisfactory, though in the second half of the year there were signs that perhaps the downward trend had ceased and that a measure of stability at a very low level had been reached. On the other hand, all public budgets, including that of the Reich, were suffering from heavy deficits, the foreign trade surplus was dwindling and there was no appreciable diminution of the burden of unemployment. The policy of protecting the mark exchange was continued, but conditions of international trade deteriorated and it was found necessary to resort to a transfer moratorium.

Dutch Electrical Imports and Exports

FROM the Dutch official trade returns we have compiled the appended tables showing the imports into and exports from Holland of electrical machinery and allied goods during the first six months of 1932 and 1933. It will be seen that the import branch of the trade was seriously affected by the general industrial depression, imports declining by no less than £184,380. On the other hand, exports advanced by £209,995. For purposes of comparison the Dutch guilders have been converted at the old rate of 12 to the £.

Dealing first with the imports, it is satisfactory to find Great Britain at the head of the list as regards electrical

IMPORTS.

		January–June. 1932. Quantity.	1932. Value £.	1933. Quantity.	1933. Value £.
Electrical machinery and parts	tons	718	92,915	2,137	253,000
Telegraph and telephone apparatus, material and parts	,,	1,291	212,500	1,170	149,665
Radio telegraph and telephone apparatus and parts	,,	1,014	294,835	916	224,115
Incandescent lamps ...	No.	2,373,500	29,415	337,200	15,915
Arc lamps	tons	11	2,165	14	1,000
Copper and brass wire and cables, not insulated ...	,,	1,940	68,500	1,864	52,165
Electric vacuum cleaners ...	No.	29,197	101,165	37,950	106,250
Wire and cables, insulated...	tons	5,485	168,580	3,891	111,415
Bulbs for electric lamps ...	,,	74	3,830	30	1,665
Other electrical apparatus...	,,	3,279	388,830	2,217	263,165
Total			£1,362,735		£1,178,355

machinery with a total of £147,085 as against Germany with £41,500 and Switzerland £36,830. In telegraph and telephone apparatus the major portion of the trade is with Germany, followed by Belgium, Great Britain, the United States, France and Sweden in that order. The bulk of the imported radio material came from Germany with smaller quantities from Great Britain, America, Hungary, France, Switzerland, and Belgium.

Of the incandescent lamps, Belgium supplied 97,000, France 55,500, Germany 46,600, and Austria 36,300. Great Britain does not appear in this section of the import returns. Germany leads in the case of uninsulated copper wire, followed by the United States. Of the vacuum cleaners, 25,658 came from Germany, 6,824 from Sweden, 2,448 from the United States, 1,785 from Great Britain, and 836 from Italy, while the bulk of the insulated wire and cable (3,140 tons) came from Germany. Imports of unclassified electrical apparatus is largely in the hands of German manufacturers, to whom 1,618 tons or over 70 per cent. of the total is attributed.

EXPORTS.

		January–June. 1932. Quantity.	1932. Value £.	1933. Quantity.	1933. Value £.
Electrical machinery ...	tons	440	44,750	353	33,500
Telegraph and telephone apparatus, material and parts	,,	110	12,000	25	4,165
Radio telegraph and telephone apparatus and parts	,,	2,396	1,326,585	2,629	1,436,330
Incandescent lamps ...	No.	8,457,900	287,915	11,291,200	351,665
Arc lamps...	tons	29	3,080	27	2,330
Bulbs for electric lamps ...	,,	601	36,250	501	32,665
Copper and brass wire, not insulated	,,	287	9,915	483	13,500
Electric vacuum cleaners	No.	2,066	8,915	1,865	5,830
Wire and cables, insulated	tons	2,018	74,750	2,347	66,250
Other electrical apparatus	,,	385	9,330	437	77,250
Total ...			£1,813,490		£2,023,485

Reference to the above table of exports shows an upward tendency, particularly as regards radio material and electric lamps. Unfortunately the official returns are not so informative on the export side as they are as regards imports. In fact, it is remarkable that while detailed information is given regarding the distribution of several relatively small items, no corresponding information is given in relation to the two important items of radio material and electric lamps, which form by far the major portion of the Dutch shipments.

Argentina and the Dutch East Indies are at present the largest buyers of Dutch electrical machinery; Palestine, Cyprus, Egypt, Syria, Argentina, the Dutch East Indies, Portugal, and Italy, in the order given, are the best customers for uninsulated copper wire, while Italy and Austria purchased the largest quantities of Dutch vacuum cleaners.

Belgian Foreign Electrical Trade

THE following table shows the Belgian imports and exports of electrical machinery, apparatus, and cognate goods during the first half of the current year as compared with the corresponding six months of 1932, the values having been converted at an exchange rate of 125 to the £. Taking the figures as given in the Belgian official returns lately issued, it will be seen that there has been an increase in the imports and only a slight fall in the exports. There is, however, a serious discrepancy in the official figures of both the imports and exports of telegraph and telephone instruments for the

	Imports. January–June. 1932. £	Imports. 1933. £	Exports. January–June. 1932. £	Exports. 1933. £
Dynamo-electric machinery ...	235,160	175,336	115,048	58,096
Dry batteries	12,912	8,136	1,064	816
Accumulators and parts	15,304	13,024	13,120	10,800
Magnets (other than electro-magnets)	2,248	3,160	8	72
Land and submarine cables ...	9,872	5,072	76,408	67,344
Insulated wires and cables	28,368	26,208	92,200	84,240
Copper wire (not insulated)... ...	1,064	656	2,024	1,616
Carbons and electrodes	22,480	19,176	512	968
Porcelain insulators	18,888	15,072	1,136	1,432
Electric globes, bulbs and glassware	25,058	23,200	10,840	7,024
Insulating tubes, junction boxes, etc.	11,568	13,616	3,392	8,264
Other insulating material	17,736	18,960	560	552
Arc lamps	1,488	4,896	—	40
Incandescent lamps	115,848	81,544	55,208	41,776
Radio valves	84,336	57,568	—	—
Electrical measuring instruments ...	77,392	73,592	3,040	3,848
Telegraph and telephone apparatus	102,448	332,992	128,208	182,000
Other electrical apparatus	487,528	410,128	74,280	90,584
Totals	£1,269,698	£1,282,345	£577,048	£560,472

first half of 1932 as printed in 1932 and 1933, which makes a considerable difference in the totals.

An analysis of the import figures shows that the bulk of the electrical machinery was supplied by Germany, with small quantities from Switzerland, France, the United States, Sweden, Great Britain and Holland, in that order. The dry batteries came chiefly from Germany and the accumulators mainly from Great Britain. Germany and Holland supplied the major portion of the land and submarine cables, and Germany, Switzerland, Holland, and France the insulated wire and cables.

Germany controls the bulk of the trade in insulating tubes and boxes, and Holland that in electric lamps and radio valves. Electrical measuring instruments are supplied chiefly by Germany and Switzerland, while the principal suppliers of telegraph and telephone apparatus are Holland, Germany, the United States, Great Britain, France and Austria.

On the export side, France, the Belgian Congo, and Holland were the largest buyers of Belgian electrical machinery. Holland took the major portion of the accumulators, and Egypt, Germany, and the United Kingdom most of the cable. The principal markets for insulated wire were Great Britain, Holland, India, South Africa, Switzerland, Sweden, Greece, and China. As regards telephone instruments, the largest buyers were Switzerland, Roumania, Holland, Spain, China, and Argentina.

The Electrical Imports of Argentina

THE following table gives the imports of electrical material into Argentina in 1932. The quantities are for the most part given in kilograms, but where weights are not recorded the value is stated in gold dollars (at 4s.) according to the valuation of the Argentine Customs Department. Imports of electrical material, excluding machinery and cable, which declined in value by $1,000,000 (or about 10 per cent.) between 1930 and 1931, diminished by $800,000 in 1932.

		Inc. or dec.	
Dynamos—	kg.		kg.
Total	1,317,000	—	2,350,000
Dynamos, not dutiable—			
Total	500	—	700
Fan motors—			
Total	2,500	—	12,500
Accumulators and parts—			
Total	1,970,000	—	310,000
Accumulators, not dutiable—			
Total	11,200	—	3,400
Batteries—			
Total	1,053,000	—	1,044,000
Ammeters and voltmeters—	$		$
Total	15,900	—	32,600
Radio-telephone apparatus and material—			
Total	2,685,000	+	272,000
Telephone apparatus and material—	kg.		kg.
Total	144,300	—	117,200
Switches, circuit breakers, cut-outs, fuses, etc.—	kg.		kg.
Total	260,200	—	210,200
Bells—	$		$
Total	38,000	—	24,000
Insulating tape—	kg.		kg.
Total	105,000	+	1,000
Change-over switches—	$		$
Total	36,000	—	23,000
Lamps—			
Total	892,000	+	166,000
Current meters—			
Total	685,000	+	648,000
Distribution boards—	kg.		kg.
Total	45,900	+	45,400
Bergmann tubes—	kg.		kg.
Total	42,000	—	65,000
Other insulating tubes—			
Total	1,759,000	—	1,207,000
Other electrical material, non-dutiable—	$		$
Total	806,000	—	552,000
Total of electrical material not including wire and cable or machinery—			
Total	7,569,000	—	804,000
Cable and wire (not telephone)—	kg.		kg.
Total	903,400	—	2,875,700
Telephone wire and cable—			
Total	3,849,000	—	7,562,000
Cable accessories—			
Total	398,000	—	559,000

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The "Kye" Shilling Lamp

On September 1st the Crompton-Kye Lamp Sales, Ltd., of Bush House, London, W.C.2, announced to the electrical trade, and through the daily Press to the general public, that they were marketing the new "Kye" lamp at the price of one shilling for 25, 40 and 60 W pearl or clear classes, not as a declaration of a price-war, but as the outcome of special study of marketing conditions and organised manufacturing practice. Several years ago the company was convinced as the result of its investigations that the hope for a shilling British lamp depended upon the establishment by an independent manufacturer of adequate productive facilities, unlimited supplies of raw material of the right quality, and financial backing to ensure a large demand. The manufacturers of the new "Kye" shilling lamp, with large financial resources at their command, have established and equipped new glass works and lamp works, and have developed a special selling policy without past commitments. It is estimated that out of the electric lamp demand of this country (upwards of seventy millions per annum) fifteen millions are imported, and it is claimed by the company that the new lamp is the first practical step which has been taken to meet this foreign competition. One of the objectives is to accompany the provision of cheap electricity under the grid scheme with cheap facilities for its utilisation.

Traders who are already stocking "Crompton" lamps will still find these available as before; they will be entitled to buy the new lamps at new discounts specified in a circular, and purchases will be counted in their total turnover with "Crompton" lamps at the end of the year for regrading purposes.

Early Bookings for the B.I.F.

Although the British Industries Fair does not open until February 19th, the Department of Overseas Trade reports that it has already received applications for more than 90 per cent. of the space occupied by exhibitors at Olympia and the White City at the last Fair. Up to August 28th applications were received from 875 prospective exhibitors for a total of 341,118 sq. ft. of exhibition space. At the 1933 Fair, 1,438 exhibitors in the corresponding groups occupied 378,867 sq. ft. In the Birmingham Section, advance bookings of space by exhibitors are so far ahead of those in any previous year that some 55,000 sq. ft. of indoor area is being added immediately to meet pressing demands. Especial activity is reported in the electrical, gas, building and engineering groups.

The E.L.M.A. Illumination Design Course

The twenty-eighth illumination design course held by the Electric Lamp Manufacturers' Association will commence on October 16th at the Lighting Service Bureau, 2, Savoy Hill, W.C.2. The course will consist of six lectures delivered on consecutive Monday evenings.

Success of Lighting Demonstration Tour

During the latter part of July the Lighting Service Bureau's touring demonstration van paid a successful visit to Crewkerne and Axminster and succeeded in interesting three hundred people in electric lighting. The following is the itinerary of the demonstrations during September and October:—September: 13th-15th, Wells; 19th-21st, Burnham-on-Sea; 25th-29th, Weston-super-Mare. October: 2nd-6th, Bristol; 9th-10th, Stroud; 11th-12th, Cinderford; 16th-18th, Melksham; 18th-21st, Devizes; 23rd-27th, Bath; 30th-31st, Worcester. While the demonstrations are being given in Bristol the opportunity will be taken to hold a local Illumination Design Conference lasting two days. The arrangements for this conference are in the hands of the Bristol Electric Circle and details will be available shortly.

Local Exhibitions

The Electricity Department of the Stewartry County Council recently held an exhibition of electrical appliances combined with a series of electric cooking demonstrations in the Town Hall, Kirkcudbright, and the display evoked much public interest. The exhibition was opened by Provost Milburn in the presence of a large gathering. This is the first of a series of exhibitions to be held in the county, and the Electricity Department, under the supervision of Mr. Norman T. Smith, county electrical engineer, hopes to give further demonstrations from time to time.

The Walthamstow Corporation Electricity Committee is considering the organisation of an electrical exhibition and cooking demonstration at the Drill Hall in October.

A Vickers Explanation

An official statement has been issued by Vickers, Ltd., as the result of certain misleading articles which have appeared in the foreign Press implying the control of subsidiaries and association with certain foreign firms with whom the company has either no connection or merely an investment. The statement explains that Vickers, Ltd., is now a holding company and details the various industrial groups to which its manufacturing interests are now confined. It states that possibly some misunderstanding as to the financial interests of the Vickers group is attributable to the fact that companies formerly owned by Vickers, Ltd., and bearing "Vickers" as part of the name have been sold without any alteration in the title of the company. It disposed of its control in the Metropolitan-Vickers Electrical Co., Ltd., which is now one of the constituent companies of Associated Electrical Industries, Ltd. Although Vickers has acquired shares in the A.E.I. as an investment, it has only a minority interest, with no participation in control or management. Vickers-Armstrongs, Ltd., are not interested in any way in the Metropolitan-Vickers Electrical Co., Ltd.

The Marconi Company's New Offices

On Monday the head offices and London research laboratories of Marconi's Wireless Telegraph Co., Ltd., were transferred from Marconi House, Strand, to the new Electra House, Victoria Embankment, London, W.C.2. The telephone number and telegraphic address remain unchanged. The company's offices are on the fifth, sixth and seventh floors of the new building, which is also to be the administrative headquarters of the Marconi International Marine Communication Co., Ltd., Cables and Wireless, Ltd., and Imperial & International Communications, Ltd., as well as the parent Marconi Co. A feature of interest of the new building is a permanent display of historical Marconi apparatus which has been arranged on the seventh floor.

Electra House, Victoria Embankment, London, the new headquarters of the Marconi Company

The Plastics Industry Exhibition

The object of the exhibition of plastic materials at the Science Museum, South Kensington, is to suggest by example how such materials can be beneficially employed in industries which at present employ them not at all or to a limited extent only. Plastic materials are composed of (1) natural resins, (2) cellulose products, (3) casein, and (4) synthetic resins. During a recent visit to the exhibition we were impressed with the methods of display adopted to show their advantages, *e.g.*, lightness, possibilities of quick production, and pleasing colour effects. A striking collection housed in several cases was that of the "Tufnol" laminated resinoid material lent by Ellison Insulations, Ltd. This included traction insulators, gear wheels, tubes, panels and other products requiring a tensile strength of up to six tons per sq. in.

Japanese Lamp Competition

For some months past Holland has been restricting the imports of foreign lamps, which had been offered at prices at which it was impossible for Dutch lamp makers to compete. Apparently the lamps were mostly of Japanese manufacture. Now the Japanese makers are supplying lamps in large quantities to the Dutch East Indian market. The question has now been taken up by a Java newspaper, the Soerabaya *Handelsblad*. Quoting from official statistics the newspaper states that Holland exported to the Dutch East Indies 1,222,937 lamps for ordinary lighting purposes in 1932, and Japan delivered 941,774 lamps in the same year. Moreover, Japan sent to the Dutch East Indies 2,574,426 bicycle and pocket flash lamps in 1932, but none was received from Holland, as the Dutch lamp makers devoted most attention to the production of lamps for lighting purposes. During the first five

months of 1933 the imports of ordinary lamps from Holland numbered 538,115, and those from Japan were 875,923. In the corresponding period of 1932 the figures were 604,148 and 348,787 respectively, so that while the exports from Holland declined by 10 per cent., those from Japan increased by 150 per cent. Despite the existence of patent and trade mark laws in the East Indies it is said that the Japanese are able to evade them. The Soerabaya newspaper states that representations have now been made to the Procureur-General with a view to ending Japanese evasion of the laws.

Municipalities in the Newcastle district of New South Wales have decided to send a deputation to interview the Australian Premier urging restrictions on the importation of electric lamps. It is stated that as a result of the competition of foreign lamp makers, particularly Japanese, the Newcastle factory of the Electric Lamp Manufacturers (Australasia), Ltd., is working part time.

The Indian market is also being flooded with cheap electric lamps from Japan in place of those from Britain, Holland, Germany and America. All qualities of these lamps are said to be 70 per cent. cheaper, and it is stated that imports from Japan have increased from 20,000 in 1931 to nearly 500,000 monthly this year. The lamps are sold retail in paper containers stating only the voltage and candle power, and without any mark to indicate the country of origin, enabling them to be sold as good Continental lamps, to which they are much inferior.

A Novel Barter Scheme

An arrangement by which British cream separators will be exchanged for Canadian ploughs has just been concluded between Messrs. R. A. Lister & Co., Ltd., of Dursley (Glos), and the Cockshutt Plow Co. of Canada, the biggest tractor plough makers in the Empire. The first consignment of Lister cream separators has already been sent to Canada, and the first consignment of Canadian ploughs, which have been specially designed for the British market, is now in this country. According to the arrangement, the Cockshutt Plow Co. will distribute Lister cream separators throughout Canada, and Lister's will distribute Cockshutt tractor ploughs throughout the United Kingdom. The arrangement is said to be a direct result of the Imperial Conference at Ottawa.

The Glasgow Radio Exhibition

An exhibition promoted by the Radio Manufacturers' Association, which concludes at Kelvin Hall, Glasgow, to-morrow (September 9th), was formally opened on September 1st by Lord Provost Swan. The ceremony took place in the City Chambers, and it took the form of a civic reception by the Corporation to the members of the Association, the speeches being relayed to the Kelvin Hall and also broadcast on the Regional programme. The Lord Provost, in welcoming the guests, said the exhibition was the first representative one to be held in Glasgow, having within it every phase of radio manufacture, and comprising, above all, British exhibits only. There was no reason why Glasgow should not become a great centre of the radio industry. Proposing a vote of thanks to the Lord Provost and the Corporation, Mr. W. W. Burnham, chairman of the Association, said that radio manufacturers were optimists. They had the success of the London exhibition behind them, and they were hoping that the Glasgow exhibition would be equally successful.

The Shipping and Engineering Exhibition

The name of Mr. T. F. Snow, who is showing lead-headed wall and roofing nails, was omitted from the list of exhibitors at the Shipping and Engineering Exhibition, Olympia, published in our last issue.

The Romance of Radio

How the Marchese Marconi first came to commence his experiments in wireless communication, the difficulties and opposition he had to overcome, and the way in which he eventually achieved success are described in a book by Mr. E. P. Leigh-Bennett entitled "A City of Sound." The "city" of the title is Hayes, where the works of the Marconiphone Co., Ltd., has grown up, the reader being taken for a tour of inspection of the various processes which are necessary to produce the modern radio receiver. The book is written in a very entertaining style and contains some good illustrations. A paper-covered edition is available upon application to the Publicity Department of the Marconiphone Co., Ltd.

I.F.S. Tariff Receipts from Radio Apparatus

According to the accounts of the Irish Free State Exchequer recently issued, receipts for the year ended March 31st last included the sum of £64,681 from the tariffs on radio apparatus imported into the Free State.

Domestic Appliances in Australia

Two schemes are proposed in a report by the committee which was appointed by the Australian Premier's Department to investigate the manufacture, sale and use of electrical materials. One is for the control of the manufacture, sale and use of domestic electrical appliances and radio sets, and the other recommends the appointment of an electricity advisory committee. Under the first scheme it is recommended that the Government should pass legislation to enable the Minister for Local Government to prohibit the sale of domestic electrical appliances and radio apparatus not in accordance with the Australian Standard Specifications, codes or requirements; the Standards Association should be asked to draw up a series of Specifications covering domestic appliances and radio apparatus; and that legislation should be passed making it an offence for anyone not a registered manufacturer or licensed electrical contractor or electrician to repair appliances. The advisory committee would be attached to the Department for Local Government and would consist of honorary members. It would be recognised as the official source of information concerning legislation. The existing industrial and scientific organisations would work in co-operation with the committee. A sub-committee has been appointed to prepare a final report, which will deal with the two schemes proposed by the committee.

A New Australian Radio Company

The Wetless Electric Manufacturing Co., Ltd., radio engineers (capital £10,000), has recently been formed in Sydney. The registered office is at 281, King Street, St. Peters.

The Canadian Vacuum Cleaner Market

According to the Dominion Bureau of Statistics, Ottawa, the production of electric vacuum cleaners and attachments in Canada last year numbered 88,697 machines, valued at $2,165,298, as compared with 107,682 worth $3,378,123 in 1931. Exports totalled 42,116, and were valued at $2,605,536.

Reduction of Portuguese Tariff on Insulators

The *Diario do Governo* (Lisbon) contains a Decree (No. 22,959) which reduces by 50 per cent. the import duty on electrical insulators for pressures of 30,000 V or over. The *Board of Trade Journal* states that firms wishing to secure the benefit of this reduction must declare to the General Administration of Hydraulic and Electrical Services the number of insulators required for the equipment of their line, and must purchase 20 per cent. of their total requirements from Portuguese sources.

Trade Announcements

Mr. Herbert J. Thormann, Perren Street, Ryland Road, Kentish Town, N.W.5, informs us that his works is now in full production for the manufacture of pressure die cast figure wheels and pinions for electricity meters, and counting devices of all types.

Messrs. Leslie Baker & Co. have commenced as electrical engineers at 21, Brentgovel Street, Bury St. Edmunds.

Expansion of business resulting from the success of the "Tenby" wiring system has necessitated the removal of the works of Messrs. S. O. Bowker, Ltd., to Tenby Works, Regent Row, Birmingham, to which address correspondence should now be sent.

New Electricity Showrooms at Boston

The Boston and District Electric Supply Co., Ltd., has now moved to "Besco House," Market Place, Boston, Lincs (telephone, Boston 555), where very commodious and central premises have been obtained for showrooms and general offices. The offices at Mount Bridge have been closed down, as well as the showrooms at 24, Dolphin Lane. The new premises, which are considerably larger than the old, consist of showrooms on the ground floor, and offices above. There are two main showrooms, the larger, which is panelled in light oak, being used for the display of lighting and heating apparatus;

The Boston and District Electric Supply Co.'s new premises at Besco House, Market Place, Boston

it contains also a small inquiry office. The other showroom is equipped as a kitchen so that domestic appliances can be demonstrated in appropriate surroundings. The front of the building is set back from the street and is of metal, with an upper strip to the window patterned in ground glass with a lightning design. The upper storeys of the building are supported on two pillars, the paving in front of the window also incorporating the lightning design.

German Electrical Imports and Exports

The industrial depression has continued to affect adversely the German electrical industry. Evidence of this is afforded

by the fact that the imports of foreign electrical machinery, fittings, apparatus and cognate material during the six months ended with June last attained a value of £755,455, as compared with £917,405 in the corresponding half of 1932. During the same period the exports of similar material from Germany declined from £13,758,495 to £8,330,375, a fall of £5,428,110, or nearly 40 per cent. The bulk of the imports are credited to Holland, Switzerland, the United States, Hungary, Czechoslovakia, Austria and Great Britain in that order, while the best customers for German material are Holland, Russia, France, Italy, Switzerland, Sweden, Belgium, the United Kingdom and Argentina.

The American Recovery Codes

According to the latest information to hand (*Electrical World*, August 26th), there seems to be considerable doubt in the minds of the National Recovery Administration staff as to the ability of the N.R.A. to bring about higher wages and shorter hours throughout the utility industry if State regulatory bodies definitely object. The N.R.A. has refused to accept responsibility for increased gas or electricity rates which may result from the acceptance of a code by utilities. Reference was made in our last issue to the resignation of two electric light and power concerns from the Edison Electric Institute, for reasons of this character. The Radio Manufacturers' Association has now agreed to comply with the code negotiated by the National Electrical Manufacturers' Association, while the National Electrical Wholesalers' Association is preparing its own code for submission, and the lighting equipment industry and the National Battery Manufacturers' Association have already submitted theirs.

The National Display Convention

The ninth National Display Convention will be held at Devonshire Hall, Cumberland Road, Leeds, on September 11th, 12th and 13th. The programme will include a lecture and demonstration by Mr. E. B. Sawyer of the Lighting Service Bureau on "Modern Shop Window Lighting," which will be given on September 11th.

For Sale

Eastbourne Electricity Department invites offers for the purchase of generating and auxiliary plant.

(See our classified advertisements.)

Social Event

On August 26th the Motor Club Section of the Igranic Social and Sports Club visited the Daventry Transmitting Station of the British Broadcasting Corporation. Between forty and fifty members of the club assembled after lunch at the Igranic Works, and drove to Daventry *via* Northampton. A pleasant drive home in the cool of the evening completed a very successful outing.

Electricity Supply in the U.S.A.

For some time past we have recorded the course of electricity consumption in the United States. Until a month or so ago there were decreases; a partial revival of business then turned the curve upward again. We are now able to see what has been the effect of the fluctuations during a complete year. Statistics issued by the Edison Electric Institute show that at June 30th, 1933, there were altogether 23,951,226 consumers (all classes) of electricity in the United States, which meant a fall of 344,536 as compared with the previous year. The number of farms served electrically in the Eastern Area increased slightly from 499,494 to 502,201, but those in the Western Area fell from 208,314 to 203,926. The total generating capacity was slightly higher, being 33,464,900 kW (advance 25,900 kW); the capacity of steam plants fell, but that of water power and internal combustion plants increased.

It is worth noting that there was a decrease in the number of domestic service consumers in the year of 262,374 to 19,706,381. There was also a drop of 82,633 in the number of commercial consumers to 4,180,483.

Improvement in American Industry

The *Electrical World* says that United States electrical manufacturing plants are becoming increasingly active. The monthly index which is based on an average month in the years 1923-25 was 112.8 in July, against 106.9 in June and 79.2 in July last year.

The "Model Engineer" Exhibition

There is much of electrical interest to be seen at the fifteenth "Model Engineer" exhibition now being held at the Royal Horticultural Hall, S.W.1. The items included in the competition section are well up to the usual standard, but the juniors, perhaps, would be better advised to look forward to what will be than to pay disproportionate regard to the engineering achievements of the past. Such apparatus as electric multiple-unit trains, electrically propelled ships, and steam turbines do not receive the attention they might from the younger exhibitors.

The following exhibits should be worth the attention of electrical engineers:—Electric tools: Pools Tool Co., Ltd., S. Tyzack & Son, Ltd., Buck & Ryan, W. Stevens & Co.; electric motors, instruments and fittings: Economic Electric Co., A. Munday, Ltd., Constructions, Ltd., Grafton Electric Co., A. J. Brown & Co., G. C. McDaniel & Co., Queen's Engineering Co. A model of a new super-imposed composite suspension for high-speed electric trains was shown by Mr. Wm. Cochrane. The music was provided by Kolster-Brandes, Ltd.; Messrs. Brooks & White are the electricians for the exhibition. The exhibition will remain open until 9.30 p.m. to-morrow (Saturday).

The Cheshire Agricultural Show

At the Cheshire County Agricultural Show, which opened at Chester on August 31st, the Chester Corporation Electricity Department had a stand on which was displayed a representative collection of types of apparatus which have already been extensively used by upwards of 300 farmers and 4,000 consumers in the Chester rural area of supply.

The stand of the Chester Electricity Department at the Cheshire Agricultural Show

Recent Contracts

The British Thomson-Houston Co., Ltd., has received the following orders for motors and control gear for Nottingham's new trolley-buses: From Karriers, Ltd., orders for twenty-five electrical equipments, including motors and control gear; and for thirty-five electrical speedometer equipments. From Messrs. Ransomes, Sims & Jefferies, orders for twenty-one control equipments and twenty-one electrical speedometer equipments.

New Electricity Showrooms and Offices

The Walthamstow Corporation Electricity Committee is applying for sanction to borrow £64,750 for the erection of showrooms and offices on the Church Hill site.

Prices of Materials

Messrs. F. Smith & Co. report, September 6th: No change in the prices of silicium bronze wire and electrolytic copper.

Messrs. Edward Till & Co. report, September 6th: India-rubber, Para fine, 4½d., ½d. decline.

Messrs. James & Shakespeare report, September 6th: Copper bars (best selected), sheet and rod, no change; English pig lead, £13 10s., 5s. decline.

Registered Electrical Contractors

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Rogerson, E., Manchester.
Wright, R., Stockport.
Robertson, R. K., Manchester.
Swift, E. M., Langley Green, Worcs.
Barber, J., Langley Moor.
Carrington & Button, Ltd., Crewe.
Honeybill, J., Fallowfield, Manchester.
Rushton, J., Farnworth, Lancs.
Brown, J., & Sons, Kirbymoorside, York.
Newton Electrical Maintenance Co., Newton Heath, Manchester.
Rogers, W. F., West Wickham, Kent.
Mallandaine & Kirkman, Weaste, Salford.
Ferguson, C. J., & Sons, Ltd., London, E.C.1.
Webb, D. S., Beswick, Manchester.
Donkin, N. H., & Co., Darlington.
Southey, A. E., & Co., Southgate, N.14.
Faulkner & Co. (Manchester), Ltd., Manchester.
Pyatt, J. V., West Didsbury, Manchester.
Brooks & Southworth, Southport.
Wellington Radio & Electrical Depôt, Perry Barr, Birmingham.
Mather (Farringdon), Ltd., London, E.C.4.
McHugh, J., Harpurhey, Manchester.
Guernsey Electricity Department.
Edmonds, T. J., & Son, Melton Mowbray.

At the same meeting four applications were withdrawn and thirteen were declined.

New Moroccan Company

A new company has been formed in Casablanca (94, Rue de Barsac) with the title of La Société Marocaine d'Installation et de Matériel Hydroélectriques, to carry on an electrical engineering business in Morocco.

Catalogues Required

Messrs. Fred Dawson & Co., wholesale distributors of electrical and radio apparatus, 6, York Place, Leeds, and 31, Spring Bank, Hull, ask for manufacturers' catalogues and lists.

New Catalogues and Lists

R. F. Winder, Ltd., Belgrave Electrical Works, Leeds.—The September price list of new and second-hand electrical materials.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.—Leaflet No. A.B.912, giving prices and particulars of "Ediswan" radio and torch batteries, accumulators, cycle lamps, torches, &c.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 912 describing the company's metal-clad high-voltage electrode water heaters.

Siemens & General Electric Railway Signal Co., Ltd., Central House, Kingsway, W.C.2.—A leaflet (No. 112) dealing with fuse boxes and terminal boxes.

Mavor & Coulson, Ltd., Broad Street, Glasgow.—A calendar-blotter for September illustrating the M. & C. putter for coal mines.

Radio Instruments, Ltd., Purley Way, Croydon.—A catalogue noting some of the latest developments in R.I. radio components.

All British I.D.L. Electric Lamp Co., 173/175, Great Portland Street, W.1.—A price list of "I.D.L." electric lamps, with particulars of a new lamp with a silvered reflector.

Midland Electric Manufacturing Co., Ltd., Birmingham.—List 203, giving a description of the "Memette" switch-fuse arranged for conduit.

T. B. Morley & Co., Ltd., Jameson Street, Hull.—A catalogue of illuminating glassware illustrated in colour.

British Isothermos Co., Ltd., Thames House, Westminster, S.W.1.—"Isothermos Technical Bulletin—No. 3," dealing with improvements in bearing lubrication on railways.

Sinterae Illuminating Co., 7, Princes Street, Westminster, S.W.1.—Leaflets describing the "Sinterae" vibratory lighting unit for the illumination of jewellery displays.

Henry Wallwork & Co., Ltd., Manchester.—A circular drawing attention to the company's wide range of gears.

Pope's Electric Lamp Co., Ltd., 5, Arthur Street, New Oxford Street, W.C.2.—Folder No. 6648, giving prices and particulars of "Elasta" lamps.

Drayton Regulator & Instrument Co., Ltd., West Drayton, Middlesex.—A leaflet (No. 161a), containing details of the Drayton type "EVST" thermostatic switch in its new form.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—A leaflet illustrating and describing metal-clad oil circuit-breakers.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—A priced and illustrated catalogue of "Efesca" electric fires,

GEC
THE GENERAL ELECTRIC COMPANY
GEC
is the largest British Electrical Manufacturing Organisation in the whole of the British Empire
30
THERE ARE 30 G.E.C. BRANCHES OVERSEAS

The General Electric Co.'s windows at Kingsway, London, are using a neat method of drawing the attention of passers-by to the company's achievements and position in the electrical industry

washers, vacuum cleaners, clocks, and other domestic appliances.

Multitone Electric Co., Ltd., 95-98, White Lion Street, Islington, N.1.—"The Multitone Guide to Class B," containing an explanation of this method of radio amplification with particulars of components.

Lissen, Ltd., Worple Road, Isleworth, Middlesex.—Leaflets giving full particulars of the company's new season's radio products, together with complete instructions for building the "Skyscraper 4" receiver.

John Shaw & Sons (Wolverhampton), Ltd., Wolverhampton.—The 1934 season's catalogue of "Grosvenor" electric fires and appliances.

Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester.—An illustrated leaflet dealing with special motors for gasworks.

Belling & Co., Bridge Works, Southbury Road, Enfield.—A catalogue giving illustrations, prices and full details of the company's complete range of electric fires, as well as some of the smaller domestic appliances such as boiling rings, grillers, &c. Also a new fire folder. A number of new fires have been placed on the market and prices generally have been reduced.

Company Liquidations

B. & W. Radio, Ltd., wireless manufacturers and dealers, Avenue Works, Hanover Park, Peckham, S.E.—The report of the Official Receiver (who is also liquidator) upon the affairs of this company has been issued, together with a summary of the statement of affairs. The liabilities are returned at £9,362 and assets valued at £750 are entirely absorbed by the preferential and debenture claims. The deficiency with regard to contributories is estimated at £8,711, the issued capital consisting of 100 ordinary shares of £1 each. The company was formed with the sole object of obtaining contracts with tobacco manufacturers for the supply of radio goods in connection with their coupon schemes. At first the goods were obtained from various manufacturers, but in May, 1931, the company began to manufacture wireless sets at Avenue Works. Twelve months later it embarked upon the manufacture of electric clocks and subsequently of loud speakers. The company's failure is attributed by the directors to the fact that the overhead expenses were out of proportion to the actual turnover; to the unexpectedly large liabilities in respect of free service given under the company's contracts with the tobacco manufacturers; and to competition by ex-employés. In the opinion of the Official Receiver the failure is primarily and directly attributable to mismanagement on the part of the directors. He adds that the circumstances relating to the issue of the debentures and the disposal of the money obtained as a result of the creation of the debenture were being investigated.

Industry & Commerce Alliance, Ltd., dealers in electrical goods, 99, Nightingale Lane, Wandsworth.—Under this compulsory liquidation the Official Receiver (who is also liquidator) reports that the company was formed in April, 1919, to carry on the business of dealers in electrical and mechanical goods of every description. The company's failure is attributed to loss of business in Brazil due to revolutions there; to inability to import foreign goods owing to the suspension of the gold standard and the operation of the Abnormal Importation (Customs Duties) Act, 1931; to bad debts in Brazil; and to loss on exchange. The accounts show total liabilities of £9,321 (ranking £7,879), assets of £1,636, and a deficiency of £7,369 with regard to contributories.

Walsall Electrical Co., Ltd.—Third and final dividend of 5s. 8d. in the £, payable September 6th at the office of the liquidator, Mr. P. Cozens, Midland Bank Chambers, Bridge Street, Walsall.

Radio Service (Nelson), Ltd.—Particulars of claims by September 15th to the liquidator, Mr. J. H. Priestley, 17, Cannon Street, Accrington.

Gambrell Brothers, Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. H. T. E. Gambrell.

Bankruptcy Proceedings

C. Morris, radio dealer, late of 39/41, Parker Street, Kingsway, and Stal House, Judd Street, W.C.—The statutory first meeting of creditors was held on Monday last at Bankruptcy Buildings, W.C. The receiving order was made on August 23rd, on the petition of Pertrix, Ltd., and a statement of affairs was submitted showing liabilities of £651 and assets of 5s. 4d. On his demobilisation in 1919 the debtor became representative to a firm on a salary and commission basis. In 1922 he met with a motor-car accident, being incapacitated for twelve months, and he then began business as a radio dealer in Shaftesbury Avenue, W.C. Later he again travelled for firms and he also sold goods on commission. In 1930 the petitioning creditors agreed to sell him, as a distributor, batteries and accumulators for twelve months. Their petition was presented against him as the result of litigation which he initiated against them but without success. To this the debtor attributes his present position. The meeting was closed and the estate remains in the hands of the Official Receiver.

J. H. Withycombe, electrical engineer and wireless dealer, 61, High Street, Barnstaple, Devon.—The first meeting of the creditors was held recently at the Guildhall, Barnstaple, when it was disclosed that the gross liabilities amounted to £1,432, of which £1,164 was expected to rank for dividend. The assets were put down at £484, so that there was a deficiency of £680. Debtor attributed his failure to overbuying and allowing customers too much credit.

P. Kalis (Ludgate Circus Radio), 4, Ludgate House, Ludgate Circus, E.C.—Receiving order made August 30th on a creditor's petition. First meeting September 12th; public examination December 7th, both at Bankruptcy Buildings, Carey Street, W.C.

D. S. B. Shannon, electrical engineer, Carlton Chambers, Lichfield Road, Mere Green.—First and final dividend of 20s. in the £, and interest at 4 per cent., payable August 30th at Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

E. V. Russell (The Skegness Electric Service), 2, Tennyson Buildings, Drummond Road, Skegness.—First meeting, September 11th, at 4 and 6, West Street, Boston. Public examination, October 12th, at the Municipal Buildings, Boston.

P. R. Andrews, electrical engineer, Middleton Street, Wymondham.—Trustee, Mr. C. B. L. Prior, 4, Eastbourne Place, Prince of Wales Road, Norwich, Official Receiver, released July 12th.

V. F. Maddox, electrical and wireless engineer, 6, Homend Street, Ledbury.—Last day for receiving proofs for dividend September 16th. Trustee, Mr. O. B. Wallis, 133, St. Owen Street, Hereford, Official Receiver.

J. T. Eaton (X.L. Service Station), wireless dealer, 13, Bolton Road, Bury.—First and final dividend of 2s. 5d. in the £, payable September 5th at the Official Receiver's office, Byrom Street, Manchester.

Dissolution of Partnership

J. G. Parker & Co., electrical contractors, Queen's Head Yard, Newcastle-upon-Tyne.—Messrs. J. G. Parker & W. M. Diericx have dissolved partnership. Mr. Parker will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Barnstaple.—OVERHEAD LINES.—The Ilfracombe Electric Light and Power Co., Ltd., is to commence work immediately on the overhead lines in the district, plans for which have been approved.

Beckenham.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £2,100.

Billingborough (Lincs).—STREET LIGHTING SCHEME.—The streets of Billingborough, which have been lighted since 1864 by gas, are now to be illuminated by electricity, the Parish Council having entered into a contract with the Mid-Lincs Electric Supply Co., Ltd., for a scheme of conversion which will mean a saving equivalent to a penny rate. Billingborough is the first village in South Lincs to adopt such a scheme.

Blackburn.—SUPPLY TO MOFFATS, LTD.—The Electricity Committee has arranged terms for supplying electricity for the enamelling furnaces of Messrs. Moffats, Ltd., at India Mill.

Burnley.—YEAR'S WORKING.—The annual report of the Electricity Committee shows a net profit of £20,719, of which £3,250 has been allocated to the relief of rates. Electrical energy sold shows a slight decrease due to the substitution of buses for trams, but a considerable advance has taken place in the use of electricity for water heating and cooking. Consumers connected number 14,923, an increase of 1,854. In his report, Mr. J. E. Starkie, borough electrical engineer, refers to the value of electricity to the textile industry, and says that the facility with which a textile factory can subdivide its productive machinery, each section being independently driven by electric motors, is a good illustration of the flexibility attained with the electric drive. Schemes for the sub-division of large manufacturing concerns into smaller units, or for the selling or hiring of looms to weavers to stimulate their interest in production, can be carried out in a simple and effective manner when electricity is the motive power. One unfortunate obstacle to attainment of a high load factor, says Mr. Starkie, is the overlapping of lighting and power loads for one or two hours per day during the winter months, a circumstance which could be avoided by a slight alteration of the working hours in factories. This rearrangement of hours would mean an improvement in the load factor of many undertakings supplying power to mills from 25 per cent. to 35 per cent. or more. The reduction in power charges possible with the higher load factor should give a considerable impetus to the use of electricity for power purposes in cotton mills.

Canada.—INCREASED DEMAND FOR POWER.—With an improvement in industrial conditions in the province, the demand for power supplied by the Ontario Hydro-Electric Power Commission is increasing, according to the Commission's statistics. Peak loads on the Niagara system have risen since April to a maximum in July of 7.7 per cent. over the corresponding period of last year, with an increase of 14.6 per cent. in electrical energy taken. The Commission is now taking steps to find an outlet in the mining district for the surplus 200,000 h.p. under development at the Abitibi Canyon in Northern Ontario. An investigation is also being made into the feasibility of establishing a development on the Albany River, in the far northern section of the province, to supply mine interests in the Crow River district and the vicinity. As a result of a recent survey of the financing of the various systems under its jurisdiction, the Commission has granted rate reductions to seventy-three municipalities and refunds to fifty others. The total plant value of all local systems is shown as $89,887,050, and reserves and surpluses accumulated by these systems amount to $56,624,716.

THE TORONTO HYDRO-ELECTRIC SYSTEM.—A decline in revenue from $12,354,456 to $12,203,103 is recorded by the Toronto Electricity Commissioners in their report on the operation of the hydro-electric system for the year ended December 31st last. Notwithstanding a decrease in the peak load from 306,084 to 297,099 h.p., the total cost of the power purchased from the Ontario Hydro-Electric Power Commission was increased by $186,018 to $6,401,270. Sales of electricity fell from 836,440,698 to 819,926,881 kWh.

Cardiff.—LOAN FOR APPARATUS.—Sanction has been received to a loan of £1,500 for the provision of apparatus for hire and hire-purchase.

UNDERGROUND CABLES.—The Electricity Committee has approved the laying of underground cables instead of overhead lines to supply twenty-two houses to be erected off Pantbach Road, Whitchurch, on the Penllyne Castle Estate.

Cheadle and Gatley.—ELECTRICITY FOR BUILDING ESTATE.—The Urban District Council has approved a scheme of the electrical engineer and manager, Mr. R. W. Willis, for supplying electricity to all premises on the Outwood Hall building estate. The Electricity Commissioners have given their sanction to the scheme, which will involve an outlay of £2,694 for mains and services, and £676 for plant and substation equipment.

Dumfriesshire.—GROWTH OF ELECTRICITY SCHEME.—A supply of electricity was made available on August 30th in Lochmaben, which was the first burgh in the county to adopt an electric street lighting scheme. A supply of electricity will be available in Moffat this week and to Sanquhar and Kirkconnel shortly. Work is now continuing with the connecting-up of the remaining villages, and it is hoped to have supplies ready for all of them by December.

Easton-on-the-Hill.—OVERHEAD LINE.—The Mid-Lincs Electric Supply Co., Ltd., is to erect an overhead spur line to supply electricity to the parish.

Eccles.—LOANS.—The Electricity Committee is applying for sanction to borrow £1,443 for e.h.p. and l.p. mains, and £933 for transformers and switchgear.

Elland.—ALL-IN TARIFF.—The Electricity Committee proposes to introduce an alternative all-in tariff for domestic premises,

The first of seven "Electromatic" vehicle-actuated traffic signal installations to be carried out at Birkenhead, that at the New Chester Road-Rock Lane intersection, was brought into service on Thursday last week by the Mayor, Councillor D. McWilliam

offices and shops, with a fixed charge based on the rateable value of the premises supplied plus a "unit" charge of ¼d.

Fleetwood.—CHEAP ELECTRICITY FOR CHARTER CELEBRATIONS.—Electricity is to be supplied to private consumers for special illuminations for the Charter Celebrations at 1d. per kWh.

France.—PROGRESS IN ALSACE-LORRAINE.—The report of the Groupement des Producteurs et Distributeurs d'Energie Electrique d'Alsace et de Lorraine for last year shows that a total of thirty-four undertakings is now associated with the Group, these comprising eight steam and internal combustion-engined plants, nineteen hydro-electric power stations —of which the most important is the Kembs plant recently described in these columns—and several plants operated by blast furnaces' gases drawn from the ironworks in Lorraine. The sales of power during 1932 reached a total of 677 million kWh, as compared with 665 million kWh in 1931. Practically the whole of the two provinces is now provided with electricity, only four communes not receiving supplies.

HYDRO-ELECTRIC DEVELOPMENT.—In a recent issue of *La Technique Moderne*, M. G. Toctron deals at length with the hydro-electric power progress that is being made in France. He says that out of the 5,384,754 kW of water power estimated by the French Ministry of Public Works to be available in the country, a total of 1,300,000 kW was being utilised at the commencement of the current year, at which date additional hydro-electrical plant to the extent of 232,325 kW was being installed.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee is to lay distributing mains at a cost of £228.

Heston and Isleworth.—ELECTRICITY CHARGES.—The Electricity Committee reports that it is not yet in a position to submit recommendations in connection with the revision of charges for the supply of electricity and the abolition of meter rents, and it has asked for a further joint report from the borough electrical engineer and the borough treasurer upon certain aspects of the matter.

EXTENSIONS.—Mains extensions costing £612 are to be carried out to supply houses to be erected in Pears Road, Hounslow. Sanction has been received to borrow £8,878 for mains and services.

AN ALL-ELECTRIC DEMONSTRATION HOUSE.—One house on the Martindale Estate is to be reserved for not more than two months after the completion of the estate as an all-electric demonstration house, subject to the Electricity Committee reimbursing the Housing Committee for the loss of rent.

STREET LIGHTING IMPROVEMENTS.—Street lighting improvements costing £1,737 are to be carried out.

YEAR'S WORKING.—The accounts of the Electricity Department show a net profit of £10,979 for last year, as against £11,712 for the previous year.

Hitchin.—LOAN.—The Urban District Council is to apply for sanction to a loan of £5,000 for the development of the electricity undertaking. Of this amount £500 is to be used for the Council's assisted wiring scheme.

Italy.—SUPPLY PROGRESS.—According to *L'Energia Elettrica*, the capacity of the electric power stations in Italy at the end of June last amounted to 4,510,000 kW, as compared with 4,455,000 kW at the corresponding date a year ago. Of the total, hydro-electric plants were responsible for 3,712,000 kW and steam and internal-combustion-engined stations for 798,000 kW. The output of electricity during the six months ended June last is estimated at 5,172,398,000 kWh, against 4,768,322,000 kWh in January-June, 1932.

Kirkcudbright.—PROGRESS OF COUNTY SCHEME.—At a recent meeting of the Stewartry County Council a report was made on the progress of the county electricity scheme. Arrangements have now been completed for taking over the undertaking at Dalbeattie, Castle Douglas, Dalry, and Twynholm, and it has been decided to charge a flat rate of 6d. per kWh for lighting County Council property, and to other local authorities and public lighting bodies. The Electricity Department is to be accommodated in Castle Douglas. It is hoped to have the service lines to the burghs and other villages in commission by the end of October. Arrangements have been made with Messrs. Buchan & Partners to direct and supervise the main constructional work.

Lancaster.—ASSISTED WIRING FOR GALGATE.—The Electricity Committee is giving residents in Galgate the opportunity of having their houses wired under the assisted wiring scheme. A canvass of prospective consumers is to be taken, and if satisfactory results are secured a supply will be given to the village without delay.

Lanchester (Co. Durham).—A LIGHTING PROPOSAL.—The question of replacing the present gas lighting system by electricity is receiving the attention of the Rural District Council.

Manchester.—SUPPLY TO FARM BUILDINGS.—The Health Committee is to provide electricity to farm buildings, &c., at the Langho Colony.

Newcastle-on-Tyne.—ELECTRICITY FOR SANATORIUM.—The City Council has confirmed a scheme for taking a supply of electrical energy from the North-Eastern Electric Supply Co., Ltd., for Barrasford Sanatorium at a total cost of £860.

YEAR'S WORKING.—The report of the Newcastle-upon-Tyne Electricity Department for 1932-33 shows a net surplus of £5,172, as compared with £5,028 for 1931-32. Income amounted to £59,200 and expenditure to £46,688, interest, redemption, and other charges totalling £7,339.

Norfolk.—PUMPING PLANT.—The Mental Acts Committee has authorised the provision of a booster pump with electric automatic gear at a cost of £363 at the Little Plumstead Colony.

Northern Ireland.—A NEW ELECTRICITY BILL.—An Electricity Bill on lines similar to those of the Bill which has recently been passed in Great Britain is to be presented by the Government during the next session of Parliament. The Belfast Electricity Committee has suggested to the Ministry of Commerce various clauses to be included in the Bill.

Padiham.—YEAR'S WORKING.—The Electricity Department made a net profit of £990 last year.

Painswick (Glos).—SUPPLY ARRANGEMENTS.—The West Gloucestershire Power Co., Ltd., has agreed to extend mains to supply Painswick.

Poland.—ASSISTANCE FOR ELECTRIFICATION SCHEMES.—The Polish Ministerial Council has decided to grant facilities for hastening the work of electrification. Expenditure on works is to be exempt from all direct and communal taxes and also from the obligation to register sales of land sites. The facilities will be accorded to such undertakings as will proceed with the construction and working of central stations of at least 10,000-kW capacity.

St. Neots.—RURAL SUPPLIES.—Tenants of Council houses at Kimbolton, Great Staughton and Hail Weston who wish to have electric lighting have applied to the Rural District Council for facilities for paying off the costs of the installation by instalments. The supply company is in a position to supply if a sufficient number of people guarantee to take electricity.

Salford.—CHANGE-OVER AND PRESSURE STANDARDISATION.—The Electricity Committee recommends an expenditure of £30,000 for change-over of supply and standardisation of pressure.

Scotland.—THE LOCHABER AND GRAMPIAN SCHEMES.—The second stages of both the Lochaber and the Grampian power schemes are approaching completion, and within the next few months the waters of the Central Highland watershed area will be harnessed. The tunnel which will convey the water of the Spean from Loch Laggan to Loch Treig and thence to the British Aluminium Co.'s turbines at Fort William is now almost finished. The work of lining it throughout with cement is practically completed, and the huge dam on the Spean, 240 ft. high and 220 ft. wide at the base, and extending across a great gorge, has come to the highest stage, and should be completed by the end of the year. With the closing of the dam on the Tummel the Grampian power scheme enters its second phase. The power-house at Tummel Bridge follows the station by Loch Rannoch into activity. The next step is expected to be the harnessing of Loch Garry and Loch Quoich, and in the west the Lochaber power scheme will eventually dam the Spey and divert its overflow waters into Loch Laggan.

SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Scottish Southern Electric Supply Co., Ltd., to supply electricity in parts of the counties of Berwick, Midlothian and Roxburgh.

Sheffield.—EXTENSIONS.—The Finance Committee has approved an expenditure of £75,000 for providing a bulk supply to Messrs. Thomas Firth & John Brown, Ltd. Sanction has been received by the Electricity Committee to the borrowing of £1,353 for mains extensions to the Woodthorpe Estate, and £6,028 for the provision of e.h.p. mains. General mains extensions costing £7,288 are to be carried out.

REVISED CHARGES.—To encourage new supplies and simplify the tariff scales, the Electricity Committee has revised its charges for electricity, making concessions representing £10,000 per annum in respect of abolished meter rents and £8,870 in respect of supplies for power, for which a flat rate of 1d. per kWh is to be introduced instead of a sliding scale of from 1½d. to 2d.; where the power charges exceed 27.39 kWh a day the sliding scale of charges is to be retained.

South Africa.—VALUE OF CAPETOWN SHOWROOMS.—Mr. G. H. Swingler, Capetown's electrical engineer, has presented a report relating to electrical showrooms. During June the showrooms issued 7,678 receipts, and received cash to the value of £44,250; the figures for the corresponding month last year were 5,059 receipts and £23,851. The total receipts of the showrooms have been £376,416. During 34 months appliances to the value of £192,000 have been sold, having a loading of 36,624 kW. These sales include 5,249 ranges, 552 refrigerators, 209 water heaters, 92 washers and 608 kettles. The whole of the purchases have been made from the local dealers, the wiring being done by local contractors, to whom £54,195 has been paid for wiring work. If the cost of the plugs and switches amounting to £15,910 and commission paid to contractors, namely £4,735, is added to the cost of appliances and wiring, the total cash paid out to the dealers and contractors as a result of this business amounts to £240,000.

PROPOSED NEW ELECTRICAL SCHEMES.—Oudtshoorn Town Council (Cape Province) has decided to raise a loan of £31,000 for a new power station and for changing over the existing plant to a.c. Bloemfontein Municipality proposes to spend £20,000 on the installation of additional cables, transformers and meters.

Spain.—THE PROPOSED GRID.—In connection with the proposal to establish an electric grid throughout Spain, the Ministry of Agriculture, Industry and Commerce has recently ordered the Industrial Statistics Section of the Spanish Department of Industry to compile a detailed list of all the electric power generating plants in the country.

Sunderland.—INQUIRY TO BE HELD.—The Ministry of Transport is to be asked to hold an inquiry to decide whether overhead or underground lines should be used in connection with the electrification of the area. The cost of the overhead and underground systems is estimated at £8,000 and £17,500 respectively. Protests against the erection of overhead lines have been made by the Ford, Ryhope, and Tunstall Parish Councils.

YEAR'S WORKING.—The Corporation reports a gross profit of £84,231 on the electricity undertaking, as compared with £70,173 in the previous year. A sum of £11,114 was allocated to the rates, as against £10,000 the year before.

Ticehurst.—OVERHEAD LINE EXTENSION.—The Weald Electricity Supply Co., Ltd., has been granted permission by the Urban District Council to extend the overhead cables between Broad Oak, Burwash, and Burwash Common.

Upholland.—ELECTRICITY FOR OUTLYING DISTRICTS.—The Urban District Council has had under consideration the extension of the electricity supply to outlying parts of the district, and is bringing pressure to bear on the Wigan Corporation to open up certain districts that appear promising.

Terms have been arranged for the provision of a supply to the Revenhead Brick Co., Ltd., in Upholland.

Walsall.—EXTENSIONS.—The Electricity Committee is to extend mains to fifty houses at Newtown (£575), and mains and a sub-station are to be provided to supply new works to be erected by Messrs. C. V. Longmore & Co., Ltd., in Goscote Lane (£1,500).

Warboys.—A SUPPLY COMING.—All the main supply cables have now been laid and most of the premises connected. The overhead cables from Huntingdon are almost completed.

STREET LIGHTING.—The Parish Council has signed a seven years' contract for electric street lighting.

Whitburn.—SUPPLY TO HOUSING SCHEMES.—A special meeting of the Town Council was held last week to consider the method of electricity supply—underground or overhead—for the Armadale Road housing scheme. Mr. Brown, engineer for the Scottish Midlands Electricity Company, was present and explained the company's attitude in the matter. The Council decided to install an overhead system at the Armadale Road housing scheme, the Union Road housing scheme system being underground. Mr. Brown explained the electricity charges as set forth in the company's agreement with the Town Council.

Winchester.—OVERHEAD LINES.—The Rural District Council is to offer no opposition to the erection by the Mid-Southern Utility Co. of a 11,000-V overhead line between Alresford and King's Worthy, subject to guard wires being provided over highways.

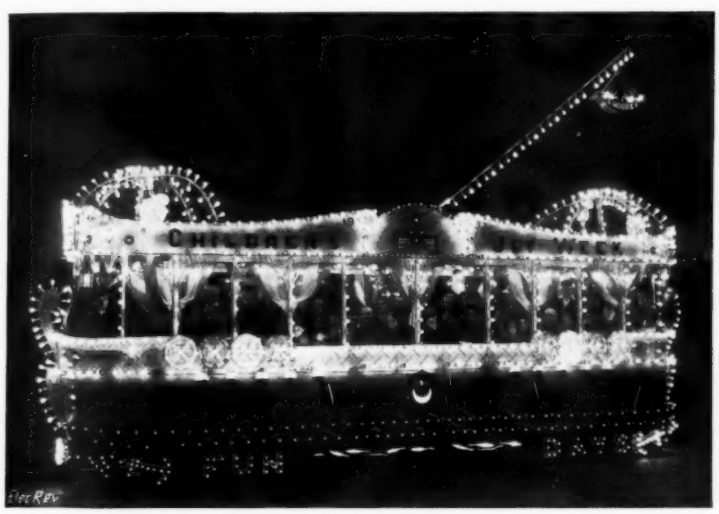
Wribbenhall (near Kidderminster).—CHURCH INSTALLATION.—A £250 scheme is to be carried out for the electric lighting and heating of Wribbenhall Parish Church.

Traction

Australia.—SYDNEY-NEWCASTLE ELECTRIFICATION SCHEME.—Estimates are now being prepared for the electrification of the main northern line between Sydney and Newcastle. The Sydney *Sun* says that so far the proposal has not been before the Commissioners for other than preliminary examination, and it is understood that they have not given any indication as to whether it will receive their final approval and recommendation to the Government. Without track realignment the fastest electric trains could not very substantially reduce the present journey time of 2 hours 45 minutes. Initially, it is estimated that twenty electric locomotives would be sufficient to operate the services. As twenty-one miles of the track from Sydney to Hornsby are already electrified, only eighty-three miles of double track overhead structures and wiring, plus a small mileage for sidings, would be required.

PROFIT ON SYDNEY TRAMWAYS.—A net profit of £1,918 was made on the Sydney tramways during the year ended June 30th. This is the first time for some years that there has been a profit; the loss in 1931-32 was £290,139. The earnings totalled £3,266,847 and working expenses £2,780,872, leaving £485,975, from which interest, exchange and sinking fund, &c., had to be deducted. Earnings were £38,375 less than last year, but the working expenses were reduced by £265,659, which is attributed to increased efficiency, economy in management, and wage reductions.

THE BENDIGO AND BALLARAT TRAMWAYS.—A report by the Victorian Electricity Commission on the Bendigo and Ballarat tramway systems states that they are in a deplorable condition, and that an expenditure of £336,000 would be necessary to bring them up to the very moderate standard of the Geelong tramways. The Commission is, however, not prepared to recommend such an expenditure in cities of population totalling about 75,000. The reconstruction recommended (as already reported) would cost £170,000. The revenue of the Bendigo tramways was £18,000 and operating expenses £17,000, the latter not including interest and sinking fund.



Portsmouth's illuminated tramcar with a happy load

Brighton.—TRACK RENEWAL.—The Tramways Committee is to renew the tram track in Dyke Road (£1,950).

Golders Green.—TRAFFIC SIGNALS.—Automatic traffic signals are to be erected at the junction of Hendon Way and The Vale.

Liverpool.—TRANSPORT DIFFICULTIES.—The fact that the Tramways Committee has agreed to give a salary of £2,500 if it can find the right man as manager of its undertaking is an indication of the importance of the transport difficulties in Liverpool. *The Times* says that the Committee does not necessarily desire an engineer, although members of that profession are not debarred from seeking the post. What the Committee needs is a man who can tackle successfully the city's tramway and omnibus problem, by abolishing the congestion that now exists and by putting the system on that paying basis it once enjoyed when it was confined to tramcars. Whatever the introduction of omnibuses has done from the point of view of the convenience of the public, it has certainly involved the city in a loss. There have been various suggestions for improvement, and the new general manager will find a heavy and difficult task before him. One of the suggestions—it was made some years ago, but was not adopted—is that the tramway system might be linked up to a certain extent with the Overhead Railway, which serves the whole eight-mile line of docks.

Lytham St. Anne's.—AUTOMATIC SIGNALS ON TRAMS.—The equipment of Corporation trams with automatic "stop" signals is under consideration.

Newcastle-on-Tyne.—INCREASED FARES LIKELY.—A hint of increased tram and bus fares is given in the annual report of the transport manager, Mr. T. P. Easton. "The present fares," he says, "are adequate to meet the costs of the service, but as taxation is increased upon the transport industry, the question arises as to how this burden is to be borne; ultimately it can only be reflected in increased cost to the users of the transport services." The net surplus on the operation of the tramway undertaking last year was £9,145, which compares with £14,644 in 1931-32. Revenue declined from £414,265 to £389,190. The buses showed a surplus of £7,411, as against £14,670.

Portsmouth.—AN ILLUMINATED TRAMCAR.—The Corporation Tramways Department used an illuminated tramcar in connection with Portsmouth Navy Week, Children's Week, and the Portsmouth Football Club. All the lamps used were Siemens traction type in various colours. More than 2,200 lamps were used for decorating the car, which was well patronised by both visitors and local people. A photograph of the car taken during Children's Joy Week is reproduced below.

Sunderland.—AUTOMATIC TRAFFIC CONTROL.—Automatic traffic signals are to be installed at the Thompson Road crossing on the Newcastle Road.

Communications

Australia.—TELEPHONY.—The number of telephones in use is 484,626, representing 7.4 per 100 of population, and placing the Commonwealth seventh in the list of telephone-using countries. At the end of 1932 there were 800,081 miles of conductors in underground cables, 103,237 miles of conductors in cables for junction circuits, 4,436 miles of conductors in aerial cables, 408,716 miles of open conductors in metallic circuits for subscribers' exchange lines, 236,209 miles of open conductors in trunk lines, and 98,369 miles of conductors in trunk lines used for both telephone and telegraph. The total mileage of pole routes was 45,410 within exchange networks and 55,097 outside. The scattered population makes the average length of line per service much greater than is usual in most countries, namely, 5.3 miles per telephone. Nevertheless, the charges are lower than in other countries, says the *Electrical Engineer and Merchandiser*. In the year ended June, 1932, the revenue was £5,411,077 and the working expenditure £3,661,253.

France.—ESTIMATED NUMBER OF LISTENERS.—*World-Radio* says that although no official figures have yet been published, it is understood that over 600,000 listeners have registered themselves for the purpose of the wireless tax in the departments of Seine and Seine-et-Oise alone. This, of course, is the most populous area, but all estimates that are being made exceed 2,000,000 listeners for the whole of France (excluding pirates).

RADIO-NORMANDIE.—The Lucerne Plan, together with the French Ferrié Plan, will affect the private stations in France, though the extent is not yet realised. Radio-Normandie (Fécamp) has been compelled to reduce its power to 700 W.

India.—BROADCASTING FROM MYSORE.—The Mysore Municipality has decided to start a broadcasting service. Dr. Gopalswamy, professor at Mysore University, is in charge of the arrangements.

London.—A NEW BROADCASTING STUDIO?—We learn from the *Wireless World* that the British Broadcasting Corporation is conducting negotiations for acquiring an old skating rink in Maida Vale which was until recently used as offices for the Ministry of Health. Here in a lofty building covering an area of 58,000 sq. ft. the B.B.C. would have at its disposal a large hall admirably suited for vaudeville and variety broadcasts, as well as a number of smaller studios. The Concert Hall at Broadcasting House is admittedly too small to accommodate the whole of the 117 players in the National Orchestra: at the Maida Vale hall there is room, in addition to the orchestra, for the whole of the National Chorus, consisting of 250 voices. The acquisition of the premises is rendered all the more desirable as the tenure of "No. 10" (the wharf) studio is exceedingly precarious, the L.C.C. having the power to take over the building at very short notice.

Northants.—RADIO RELAY SERVICES.—Mr. W. A. Fathers is expected to commence work at once in connection with the relay services he is promoting in Finedon, Irthlingborough, and Higham Ferrers, Northants.

Trinidad.—WIRELESS STATION LEASE DISAPPROVED.—The City Council has passed a unanimous resolution expressing regret that it is unable to be a party to the transfer of the wireless stations at Trinidad and Tobago to Imperial and International Communications, Ltd., on the terms of the draft lease forwarded by the Government to the municipality. The terms, says *The Times*, provided that the stations should be taken over at an annual rental of £120.

Wigan.—POLICE RADIO.—At a recent meeting of the Watch Committee the chief constable reported on the progress in connection with the provision of wireless for police purposes. He invited the members of the Committee to witness a demonstration of the apparatus installed at the central police station and in police motor cars.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Adwick-le-Street.—September 25th. Urban District Council. 1,600 prepayment meters. (See this issue.)

Argentina.—BUENOS AIRES.—September 13th. Argentine State Oilfields. Two transporters (electric trucks) with jib crane, specially designed for the transport over cement roads of tubes containing sulphurous anhydride. (G.Y. 12891.)*

Australia.—ADELAIDE.—October 17th. Engineering and Water Supply Department. Four turbo-blowers and three compressors, with motors and starters. (G.Y. 12890.)*
MELBOURNE.—Post and Telegraph Department. September 19th. Maintenance parts for handset telephones. (A.Y. 11964.)*
September 26th. Bell sets and portable telephones. (A.Y. 11963.)*

Brazil.—RIO GRANDE.—September 29th. Viacas do Rio Grande do Sul. 1,000 dry cells for telephones. (A.Y. 11969.)*

Cheadle & Gatley.—September 15th. Electricity Department. E.h.p. cable. (September 1st.)

Cupar.—September 19th. Fife and Kinross District Asylum. Electrical work, cooking appliances, &c., for central kitchen. Mr. A. D. Haxton, architect, Commercial Road, Leven (deposit £1 1s.).

Dumbarton.—October 6th. County Council. Electrically operated swing bridge over the Forth and Clyde Canal at Erskine Ferry Road, Old Kilpatrick. Messrs. Crouch & Hogg, chartered civil engineers, 17, Lynedoch Street, Glasgow (deposit £5 5s.).

Dumfries.—September 12th. County Council. Various works, including electric lighting installations, at housing schemes. County clerk, County Buildings, Dumfries.

Dundee.—September 13th. Electricity Department. L.p. cable. (August 25th.)

Eastbourne. — September 16th. Electricity Department. Meters. (See this issue.)

Egypt.—CAIRO.—October 5th. Ministry of the Interior. 1,000 a.c. meters. (A.Y. 11948.)*
November 14th. Pumps, electric motors, boilers, &c. (G.Y. 12912.)*
October 28th. Three-phase generating set and two batteries of condensers for power factor improvement. (A.Y. 11953.)*
November 14th. Prisons Administration. Machinery, including electric motors, switchboard and cables, for extension of Delta Barrage Spinning Mills. (F.Y. 1841.)*
ALEXANDRIA.—October 25th. Ports and Lighthouses Administration. Electric cables, switchgear, transformers, electrically driven hauling winches and motors for the port of Alexandria. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, London, S.W.1. (Specifications, &c., 12s., not returnable.)
GIZA.—October 5th. Ministry of Education. Cables, switchboards and other electrical apparatus. (A.Y. 11957.)*

Folkestone.—September 16th. Town Council. Internal and external wiring of houses, Penfold Road. Mr. E. L. Allman, borough engineer.

Guildford.—September 25th. Corporation. Installation of electric lighting, &c., at Council Offices, Millmead House. Mr. J. W. Wilton, Millmead House, Guildford (deposit £1 1s.).

India.—NEW DELHI.—December 4th. Indian Stores Department. 220/230-V, single-phase, 50-cycle ceiling fans. (A.Y. 11959.)*
December 11th. D.c. ceiling fans. (A.Y. 11965.)*
January 8th. A.c. and d.c. table fans. (A.Y. 11967.)*
October 25th. A.c. and d.c. meters. (A.Y. 11968.)*

Irish Free State.—DUBLIN.—September 20th. Corporation. Two automatically controlled electrically driven axial flow pumps (10,000 gal. per minute each). City engineer, Castle Street.
CORK.—September 15th. Corporation. Electric lighting of new municipal offices and City Hall. Messrs. McAteer & MacEntee, consulting engineers, 9, Dawson Street, Dublin (deposit £10 10s.).
MONAGHAN.—September 21st. Installation of electric lighting plant at the Monaghan Mental Hospital. Mr. Gallagher, clerk, Mental Hospital.

London.—HOLBORN.—October 3rd. Borough Council. Vehicle actuated traffic signals in Kingsway and Great Queen Street. Borough engineer and surveyor.
SOUTHWARK.—September 13th. Borough Council. Two 2,000-kW motor convertors, four 1,000-kVA transformers, a.c. and d.c. switchgear. (August 25th.)
BERMONDSEY.—September 16th. Borough Council. Electric cable, equipment, and accessories. (August 25th.)

New Zealand.—WELLINGTON.—October 24th. Public Works Department. Four 3,333-kVA, 110-kV transformers. (A.Y. 11936.)*
September 19th. Post and Telegraph Department. Telephone keys and mountings. (A.Y. 11952.)*
October 26th. 12-V switchboard lamps (A.Y. 11955)* and telephone gongs and attachment nuts. (A.Y. 11956.)*
October 31st. Metal cased condensers. (A.Y. 11954.)*

Plymouth.—September 13th. Corporation. Electric heating, lighting and hot water supply for clinic at the City Hospital, Plymouth. City architect, Rowe Street.

Salford.—September 22nd. Electricity Department. 6,600/400-V three-phase oil-immersed transformers. (September 1st.)

South Africa.—PRETORIA.—September 22nd. Government Supplies Board. Radio measuring instruments. (A.Y. 11940.)*
JOHANNESBURG.—September 16th. City Council. Ten miles of weatherproof copper conductor. (A.Y. 11947.)*
Twenty miles of 19/0.052 double-braided weatherproof copper conductor. (A.Y. 11960.)*
October 9th. South African Railways and Harbours. Copper contact wire and copper cable. (G.Y. 12901.)

Swansea.—October 9th. Electricity Department. Coal-handling plant for the new Tir John power station. (See this issue.)

West Riding.—September 14th. Mental Hospital Board. Three months' supply of electric lamps. Mr. G. L. Banner, clerk, Board offices, Wakefield.

---

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Blackburn.—Electricity Committee. Accepted. Cables.—Derby Cables, Ltd.

Eccles.—Electricity Committee. Accepted. Oil switch at Monton Road sub-station (£72).—British Thomson-Houston Co., Ltd. Metal-clad transformer ring main e.h.p. control unit for Lane End sub-station (£214).—Park Royal Engineering Co., Ltd. Six-way l.p. distributing board for Lane End station (£39).—Parmiter, Hope & Sugden, Ltd.

Glasgow.—Education Committee. Accepted. Electrical work at St. Mary's (Maryhill) School annexe (£388).—J. Edward.
Municipal Transport Committee. Accepted. Burglar alarm system at head office.—T. Land & Son. Insulated cables for subway.—Craigpark Electric Cable Co., Ltd.

Hendon.—Highways Committee. Recommended. Traffic signals at junction of Edgware and Station Roads (£124).—Forest City Electric Co.

Heston and Isleworth.—Electricity Committee. Recommended. Underground disconnecting boxes (£151).—W. T. Henley's Telegraph Works Co., Ltd.

Hyde.—Highways Committee. Accepted. Traffic signals at Market Street.—Barber & Coleman, Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Rewiring of the police and fire stations in the east end of the city (£143).—Falconar Cross & Co., Ltd.

Salford.—Electricity Committee. Recommended. Alterations to oil circuit-breakers (£1,398).—Ferguson, Pailin, Ltd.

Sheffield.—Electricity Committee. Accepted. Switchgear extensions at Blackburn Meadows power station (£9,910).—General Electric Co., Ltd.

Walthamstow.—Electricity Committee. Accepted. Two 1,000-kVA transformers (£550 each) and two 800-kVA (£480 each).—Fuller Electrical & Manufacturing Co. Two distributing boards (£257).—English Electric Co., Ltd.

Wrexham.—Housing Committee. Accepted. Wiring twenty houses on Rhostyllen estate (£105).—Jones and Williams.

The First British Diesel-electric Tug

THE *Acklam Cross*, which claims the distinction of being the first British Diesel-electric tug, has been built by Hall, Russell & Co., Ltd., to the order of Robinson & Crosthwaite, of Middlesbrough, who are the managing owners for the Tees Towing Co., Ltd. The vessel is 90 ft. long with a breadth of 22 ft.

The propelling machinery consists of two high-speed Diesel engines of the Brotherhood-Ricardo pattern supplied by Peter Brotherhood, Ltd., each engine driving a d.c. generator and exciter. The exciters also supply current for charging a battery for lighting and other purposes. Current from the main generator is supplied to a motor which is directly coupled to the single propeller. The propelling machinery is controlled from any one of four positions, two in the wheel house and two on the flying bridge, this remote control, which is one of the great advantages of electrical propulsion, being of particular value on a tug which often has to operate in congested waters. The whole of the electrical equipment was supplied by the General Electric Co., Ltd.

The main engines are electrically started, and for this and other services there have been installed two batteries, each of which will start either engine at least the six times required by Lloyds, and will also supply all lighting and auxiliaries, these normally being supplied from the auxiliary generator. This equipment has been supplied by the Chloride Electrical Storage Co., Ltd., Manchester. The steering gear and windlass, which are of the electro-hydraulic type, were manufactured by Gemmell and Frow, Ltd., Hull. At the trials the maximum speed attained was 11.50 knots.

Notes

The Last Tower

On September 5th the last of the 26,265 towers of the grid was erected at Breamore, near Fordingbridge, Hants. The work took ten men 1¼ hours. The tower weighs four tons and is 70 ft. high; the first 45 ft. had been assembled on the ground and the parts for the remainder were hoisted and bolted into position. A luncheon at the Royal Bath Hotel, Bournemouth, followed the completion of the work, at which Mr. F. B. de Hart (Callender's Cable & Construction Co., Ltd.), presided. Mr. Hart stated that his company had worked under great pressure in the latter part of last year, when most of the records for tower construction had been broken, and during the past month another record had been set up by the erection of the last eleven miles of the Bournemouth-Southampton section.

Mr. J. W. Beauchamp (manager, South-West England and South Wales Area of the Central Electricity Board) said that, apart from a little trouble with regard to the New Forest, landowners and tenants had shown by their helpful attitude that they appreciated the importance of the work of the Board. He anticipated that between the next ten and twenty

The erection of the last of the grid towers

years, the nature of home life and the outlook of the housewife in this country would be entirely changed and the health of the people improved by the bringing of electricity to places where it was not now available. The grid was only a backbone of the great electrical structure which interconnected the power stations, and the Board was looking earnestly to the 500 or 600 authorities with powers of electricity supply to follow up the grid. They should show courage and imagination and should cast their bread upon the waters, running out thousands of miles of lines to distribute electricity. Some criticism had been made of the overhead lines on the ground that they might spoil the natural beauty of England, but they would have to put up very many more before they even began to cause injury.

Among others present at the function were Mr. S. B. Donkin (Messrs. Kennedy & Donkin, consulting engineers to the Central Board), and Messrs. C. F. Barrow and S. Harrison, of Callender's Cable & Construction Co., Ltd.

The "Railplane"

Tests were carried out at Glasgow last week with the "Railplane" which is illustrated on page 319. In this the cars are suspended from bogies running on an overhead rail. They are propelled by electric motor driven airscrews fore and aft, and it is claimed that a speed of 100 m.p.h. can be attained. This form of transport has been suggested by Mr. Charles Boot (Henry Boot & Sons, engineers and contractors) as a means of clearing the London slums, as city dwellers could be moved out a considerable distance and still be able to get to their work speedily and conveniently.

The E.A.W.

An interesting programme for London members of the Electrical Association for Women during the autumn will include visits to the Hoover factory, the Broadcasting House, and the *Daily Mail*. Lectures will be given and three meetings will be devoted to an inquiry into the design and performance of domestic electrical appliances. At the Housecraft School meetings of the Demonstrators' Circle will be continued on Monday evenings. A special course of lectures for teachers is being arranged on Thursday evenings, and a third series of public lecture-demonstrations for the housewife on Friday afternoons will comprise practical hints on electric cooking and washing. Miss Haslett, the director, informs us that electrical men who would like to visit the School and Club Room will be heartily welcomed.

The first examinations for the Electrical Housecraft Diploma were held on September 7th at the Grid Houses throughout the country, by courtesy of the Central Electricity Board.

Fatality at Battersea Power Station

An accident, attended by fatal consequences to one man, occurred at the new Battersea station of the London Power Co. on the morning of August 30th. Herbert Cryer, one of the switchgear erectors employed by the Metropolitan-Vickers Electrical Co. in carrying out its contract, had to do some work on a section of the 66-kV switchgear which is now normally alive from other stations of the company. He applied to the proper officer for a permit to work on the section, which was given him in the regulation way, and the section was made "dead" accordingly. Cryer with his assistants went to the switchgear, but opened up a different section from that to which the permit referred. This section was "alive," and as soon as Cryer started to work he came into contact with live metal and was at once enveloped in flames. He and two other men were taken to St. Thomas's Hospital, where Cryer died. The others are suffering from slight burns and shocks. Cryer was a highly skilled, competent man, who had been engaged on the work from its commencement, and knew the switchgear thoroughly. The regulations for safety were observed, excepting that he went to a section for which he had no permit. There was no damage to the buildings, nor any interruption to the supplies given by the London Power Co.

The inquest was held at the Lambeth Coroner's Court on September 4th. Mr. H. A. Ratcliff, chief electrical engineer to the London Power Co., said that Cryer and his fellow employés were engaged in making preparations for some tests that were to be made by engineers of the Metropolitan-Vickers Co. It was the main switchgear at the power station. Mr. G. M. S. Sichel, district engineer to the Metropolitan-Vickers Co., said that Cryer had been working under his direction. At the time of the accident the final test of a series that had been going on for several weeks was being made; this involved the application of a test voltage to the permanent conductors. For this purpose the conductors on which deceased had to work were made "dead." For some reason which they could not understand Cryer went to an adjoining part of the switchgear which was "alive" and proceeded to fix the test connection. As soon as the connection, which was being lowered into place, made contact with the live conductor there was a large flash, which burnt him severely and caused injuries which were fatal. The voltage was approximately 38,000. Deceased was a capable man who had carried out the same operation a number of times.

Mr. Walmsley (representing the Metropolitan-Vickers Co.) said that it was difficult to find ways and means of preventing accidents like this. The company would be only too happy to collaborate with the Power Co. and the Home Office with a view to preventing a recurrence. Dr. J. Oliver, of St. Thomas's Hospital, said that Cryer died from burns. There was no evidence to show that he had received a powerful electric shock. It might have been a surface shock. A verdict of "Death by misadventure" was returned.

Educational

Examinations will be held on September 26th and 27th for three scholarships in engineering at the Northampton Polytechnic Institute, E.C.1.

The Regent Street Polytechnic, W.1, commences its new evening session of courses in electrical engineering, telegraphy and telephony, wireless and high-frequency engineering on September 25th. Two special courses will be held in electrical technology.

Enrolment commences on September 18th for day and evening courses in electrical engineering at the Borough Polytechnic, S.E.1.

(See our classified advertisements.)

Our Industrial Future

The above is to form the subject of an address to be delivered by Mr. A. P. Young at the opening luncheon of the Batti-Wallahs' Society for the 1933-34 session. The function will take place at the Hotel Metropole on Wednesday, September 27th, at 12.30 for 12.55 p.m. sharp. President W. Lang will take the chair.

Appointments Vacant

Lady cooking demonstrator and showroom assistant for Warrington Electricity Department.

Shaft engineer for Aden Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

BETA washing machine.

WATERLEY electric cooker.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. Kay, formerly with the development staff of the British Thomson-Houston Co., Ltd., has been appointed sales engineer for the London and Home Counties district by the Croydon Engineering Co., Ltd.

Mr. H. Southall

Mr. H. Southall, the author of the article on "Electricity Supply Costing" which is printed on page 323 of this issue, is chief clerk in the Birkenhead Corporation Electricity Department and is therefore well qualified to deal with the problems of the commercial and financial side of electricity supply.

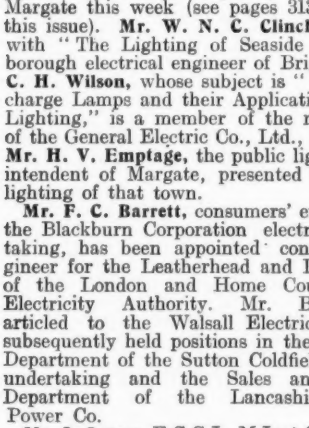
Mr. J. J. Denison-Pender, deputy chief general manager of Imperial and International Communications, Ltd., left England on September 2nd on the *Andalucia Star* for Rio de Janeiro. His visit will last for nearly three months and he will tour the stations of the Western Telegraph Co. in Brazil, Argentina, and Uruguay.

Mr. T. Robinson, meter inspector in the Burnley Corporation Electricity Department, was married on August 31st to Miss G. Greenwood, who is an assistant in the Corporation Electricity Showrooms.

We reproduce herewith the portraits of the authors of three of the papers presented at the annual conference of the Association of Public Lighting Engineers at Margate this week (see pages 313 and 314 of this issue). **Mr. W. N. C. Clinch,** who deals with "The Lighting of Seaside Resorts," is borough electrical engineer of Brighton. **Mr. C. H. Wilson,** whose subject is "Electric Discharge Lamps and their Application to Public Lighting," is a member of the research staff of the General Electric Co., Ltd., at Wembley. **Mr. H. V. Emptage,** the public lighting superintendent of Margate, presented data on the lighting of that town.

Mr. F. C. Barrett, consumers' engineer with the Blackburn Corporation electricity undertaking, has been appointed consumers' engineer for the Leatherhead and Dorking area of the London and Home Counties Joint Electricity Authority. Mr. Barrett was articled to the Walsall Electrical Co., and subsequently held positions in the Installation Department of the Sutton Coldfield electricity undertaking and the Sales and Publicity Department of the Lancashire Electric Power Co.

Mr. J. Severs, F.C.G.I., M.Inst.C.E., M.I.E.E., whose retirement on age limit from the post of electrical engineer at the Royal Arsenal, Woolwich, is announced, is a native of Bingley, Yorkshire. Mr. Severs received his education at the Bingley Grammar School, following which he served an apprenticeship with Messrs. Thwaites Bros., of Bradford. He then became a student at the City and Guilds Central Technical College, and at the termination of his course was appointed to a demonstratorship in Electrical Engineering under the late Professor Ayrton, F.R.S. Mr. Severs, however, forsook academic paths and took an active part as assistant electrical engineer in the construction and equipment of the Central London Railway, afterwards performing similar duties under the late Sir Ernest Moir on the G.N. & City Railway for Messrs. S. Pearson and Son, Ltd. On the completion of the railway in 1904 he transferred his services to the railway company and was responsible for the running and maintenance of the permanent way, rolling stock, and repair shops. In 1913 he joined the staff of the Royal Arsenal, Woolwich, as electrical engineer, and since 1914 has been responsible for the generation and distribution of electricity within the Arsenal. Mr. Severs's present address is 7, Vanbrugh Fields, Blackheath, S.E.3.



[Elliott & Fry

Mr. J. Severs

Miss Dorothy Vaughan has been appointed electrical housecraft lecturer at the Housecraft School of the Electrical Association for Women, 20, Regent Street, S.W. Miss Vaughan was for some years chief woman demonstrator to the Hotpoint Electric Appliance Co., Ltd., during which period she trained many girls for the electrical industry. Subsequently she worked with the North Metropolitan Electric Power Supply Co., where she was mainly concerned with lecturing to women's organisations. **Miss Anna Holm,** who helped with the inaugural work of the Housecraft School, has now returned to Newcastle to rejoin her old company. She will continue to assist in the work of the E.A.W. in the North-East Coast area.

Miss Dorothy Vaughan

Chloride Changes.—Mr. W. S. Naylor has relinquished the position of managing director of the Chloride Electrical Storage Co., Ltd., but continues as chairman of the board. Mr. D. P. Dunne remains as sole managing director, and Mr. Naylor's former post of general manager has been filled by the appointment of Mr. A. W. Brown as commercial manager. Captain H. V. Schofield has been appointed sales manager. Mr. F. Crawter's retirement from the position of London manager to the company was recorded in our issue of June 30th.

Messrs. W. N. C. Clinch, C. H. Wilson, and H. V. Emptage

Mr. W. H. Walton has been re-elected chairman of the executive committee of the Electrical Contractors' Association, and has also been appointed to represent the Association on the new committee which is to be set up to put Committee "D's" fair-trading policy into effect.

Mr. J. L. Van Os, managing director of the Dominion Electrical Co., sailed for New York on business by the *Europa* on September 3rd.

Obituary

Mr. J. Tennant.—The death occurred on August 29th, at Fairlie, Ayrshire, of Mr. James Tennant, J.P., a director of the North Eastern Electric Supply Co., Ltd., at the age of 82.

Mr. C. F. Hilton.—The death is announced in *The Times* of Mr. Christopher Frederick Hilton, A.M.I.E.E., late of Hythe, Kent, which occurred on August 31st at Ashcombe Rectory, Dawlish, in his sixtieth year.

Wills.—Mr. Oswald Muskett Andrews, M.I.E.E., late of the St. James' and Pall Mall Electric Light Co., Ltd., left estate of the value of £15,182 (net personalty £15,028).

Mr. C. E. Pitman, late Director-General of Indian Telegraphs, left £9,391 (net personalty £7,787).

Major G. B. Parratt, for many years director and secretary of Messrs. Belliss & Morcom, Ltd., left £159,576 (net personalty £157,872).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Gambrell Bros. & Co., Ltd.—Private company. Registered September 1st. Capital, £50,000 in 25,000 6 per cent. cumulative preference shares of £1 each and 100,000 ordinary shares of 5s. each. Objects: To acquire the business of electrical and mechanical engineers, and makers of and dealers in all kinds of scientific instruments and appliances and machinery of all kinds, carried on by Gambrell Brothers, Ltd., at Merton Road, Southfields, S.W. The provisional directors are: R. Annan, "Saxonbury," St. Mary's Road, Surbiton, and H. T. E. Gambrell, Linden Road, Leatherhead. Secretary: H.T. E. Gambrell.

Philco Distributors (Scotland), Ltd.—Private company. Registered in Edinburgh on August 30th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, importers, exporters, factors, merchants, and distributors of all descriptions of electrical and other instruments, appliances, materials, supplies and components in connection with radio telegraphy and telephony, television, &c. The directors are: R. Hardman, 3, Kenion Road, Bamford, Rochdale, and F. Grindred, "Holmedene," Bamford, Rochdale. Registered office: 74, York Street, Glasgow.

Relay Systems, Ltd.—Private company. Registered September 1st in Edinburgh. Capital, £7,000 in £1 shares (3,500 7½ per cent. cumulative preference and 3,500 ordinary). Objects: To acquire and take over the whole rights, privileges, title, interest and obligations of W. E. Reid, 14, Bridge Street, Hawick, and to carry on business of a wireless relay service. The directors are: W. E. Reid, Terrington, Wilton Hill, Hawick, and two others. Registered office: 10, Bridge Street, Hawick.

Stirdus, Ltd.—Private company. Registered September 1st. Capital, £10,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical, mechanical, and general apparatus, vacuum cleaners and sweepers, domestic appliances, &c. The subscribers are: S. B. Smith, 4 & 6, Throgmorton Avenue, E.C.2, and O. Heim, 24, Eton Avenue, N.W.3. Solicitors: Munton Morris King & Co., 30, Bedford Row, W.C.1.

E. Dyne & Co., Ltd.—Private company. Registered September 2nd. Capital, £2,000 in 1,800 8 per cent. preferred ordinary shares of £1 and 4,000 deferred shares of 1s. each. Objects: To carry on the business of electrical, consulting and mechanical engineers, contractors, agents for, manufacturers of and workers in electricity, motive power and light, &c. The directors are: E. E. Dyne and Florence J. Dyne, both of 247, Bromley Road, Catford, S.E.5; and C. H. Meggs, 151, Bellingham Road, Catford, S.E.6. Secretary: C. H. Meggs. Registered office: 247, Bromley Road, Catford, S.E.5.

John Ismay (Neon Signs), Ltd.—Private company. Registered August 24th. Capital, £1,005 in 1,000 6½ per cent. cumulative preference shares of £1 each and 100 ordinary of 1s. each. Objects: To carry on the business of manufacturers and suppliers of incandescent and electric lights, &c. The directors are: J. Ismay, 10, Warwick Gardens, Ilford; and T. Carmen, 24, Parkside Drive, Watford. Registered office: Roden Street Works, Ilford, Essex.

Molloy & Co., Ltd.—Private company. Registered in Dublin August 26th. Capital, £30,000 in £1 shares. Objects: To carry on the business of mechanical and electrical engineers, electricians, machinists, &c. The directors are: Mrs. M. Molloy and J. Molloy, both of Farney Castle, Thurles, Co. Tipperary; and F. Molloy, address not stated.

Returns of Electrical Companies

British Columbia Electric Railway Co., Ltd.—Capital, £6,320,000 in £1,440,000 5 per cent. cum. perpetual preference stock, £1,440,000 preferred ordinary stock, £2,406,103 deferred ordinary stock, and 1,033,897 unissued shares of £1. Return dated February 9th, 1933. All the preference, preferred ordinary and deferred ordinary stock taken up. £5,086,104 15s. paid on the preference, preferred ordinary and £2,206,103 deferred ordinary stock (including £1 15s. paid in forfeited shares), £200,000 considered as paid on £200,000 deferred stock. Mortgages and charges: £2,820,670.

City of London Electric Lighting Co., Ltd.—Capital, £2,400,000 in 400,000 6 per cent. 1st preference, 300,000 8 per cent. 2nd preference, 1,600,000 ordinary, and 100,000 unclassified shares of £1. Return dated April 5th, 1933. All the 1st and 2nd preference and ordinary shares taken up. £1,500,000 paid on the 1st and 2nd preference and 800,000 ordinary shares, £800,000 considered as paid on 800,000 ordinary shares. Mortgages and charges: £985,570.

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in £1 shares (100,000 6 per cent. preference, 200,000 5 per cent. 2nd preference, and 4,320,000 ordinary). Return dated May 17th, 1933. 100,000 6 per cent. preference, 179,056 5 per cent. 2nd preference, and 4,299,650 ordinary shares taken up. £1,029,884 paid on 179,056 5 per cent. 2nd preference and 850,828 ordinary shares, £3,548,828 considered as paid on 100,000 6 per cent. preference and 3,448,828 ordinary shares. Mortgages and charges, nil.

Gambrell Bros., Ltd.—Satisfaction in full on August 17th, of Land Registry charges dated January 12th, 1916, October 30th, 1917, and charge dated November 4th, 1930, and registered January 25th, 1916, November 17th, 1917, and November 14th, 1930, respectively. (According to the register of mortgages, the charges registered January 25th, 1916, November 14th, 1917, and November 14th, 1930, originally secured all moneys due to bank.)

Debenture dated August 1st, 1933, to secure £6,500 and premium of 6 per cent., charged on certain land, buildings and premises at Merton Road, Southfields, S.W., and the company's undertaking and other property, present and future, including uncalled capital. Holder: Sir Frederick Trouncer, Crowhurst Place, Lingfield.

City Notes

The West Devon Electric Supply Co., Ltd.—Presiding at the first annual meeting, held recently at Tavistock, Mr. F. Christy said that the trading profit amounted to £5,996, while profits from subsidiary companies brought the gross profit to £8,215. The progressive policy of introducing new tariffs had resulted in substantial increases in all districts. There were now nearly fifty miles of 11,000-V mains in operation, and they were being rapidly extended. Supplies had already been given to the districts of Lydford, Exbourne, Sampford, Courtenay, Marytavy, Petertavy, Dousland, Walkampton and Crapstone, and within the next few months Bere Alston, Bere Ferrers, Buckland Monachorum, Milton Abbot, Lifton and Chagford would also be linked up. The company had purchased the undertakings at North Tawton and Princetown, and had acquired the whole of the shares in the Bude Electric Supply Co. and the Holsworthy Electric Supply Co., and it was expected that before next year they would also be linked into one comprehensive scheme. With regard to future developments, application had been made to the Electricity Commissioners for statutory powers over the adjoining area, extending to Bude in the west and Clovelly in the north. They expected that those powers would be granted shortly, when the company would have a supply area of about 825 sq. miles, with a population of about 63,000. The company's report was dealt with in our issue of August 25th (page 269).

The London Nigerian Power Co. proposes to redeem £121,387 of 7½ per cent. first mortgage debenture stock on March 1st next. According to the *Financial Times* negotiations are proceeding with a view to replacing the existing stock by a new issue bearing a lower rate of interest. It is hoped to make the issue before March 1st next, when debenture stockholders will be given the opportunity to convert into the new stock.

Companies to be Struck Off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary: Abba Electrical Co., Ltd.; British Radio Valve Service, Ltd.; International Radio & Electrical Corporation, Ltd.; Terminus Radio (Victoria), Ltd.

The Central Electricity Board has applied to the Electricity Commissioners for a Special Order for the purpose of authorising an increase in its borrowing powers. The Board has power to borrow up to £50,000,000, of which the Commissioners have already given consent in respect of £46,925,000.

The Auckland Transport Board, which paid the July dividend on its bonds in New Zealand currency, has, according to *Reuter*, cabled its London financial agents instructing them to pay the difference between New Zealand currency and sterling on these coupons.

Clarke, Chapman & Co., Ltd., have decided not to pay an interim dividend on the ordinary shares. Last year an interim dividend of 2½ per cent. was paid, followed by a final dividend of 1½ per cent.

The Brazilian Traction Light & Power Co. has declared a quarterly dividend of 1½ per cent. on the cumulative preference shares.

The British Columbia Power Corporation has declared a quarterly dividend of 50 cents per share on the class "A" shares (same).

The Electrolytic Zinc Co. of Australasia has declared a dividend of 8 per cent. per annum for the year ended December 31st last on the preference shares.

The South Metropolitan Electric Light & Power Co., Ltd., has announced an interim ordinary dividend of 3 per cent., less tax (same).

The Killamarsh and District Electric Supply Co. is paying a dividend of 5 per cent. for the year, less tax.

Stocks and Shares

TUESDAY EVENING.

THE pace of the business which has come into the Stock Exchange Markets at the present time shows but a slight sign of slackening. People are returning from their holidays, and asking whether it is too late for them to take a hand in the markets which have been of late so active, and in which a good deal of profitable investment, as well as speculation, has taken place during the past few weeks. It is true that the number of new issues is small, in accordance with the usual tendency at this time of year. The amount of money available for investment is, however, not only very considerable, but is also constantly accumulating, and during the coming autumn the public are likely to be offered plenty of opportunities for subscribing for stocks and shares of new issues. Every business-day in the Stock Exchange adds fresh testimony to the amount of capital awaiting profitable use. Evidence is also forthcoming of the revival of industry in a good many directions, but general trade has not yet gathered sufficient volume to make any perceptible difference to the amount of capital seeking investment, and the Government is expected to take advantage of the easy money conditions, in order to float a funding loan at some early date.

London Passenger Transport

London Passenger Transport "A" stock has risen to 115. The other classes of security hold their rises of last week, and the new stocks have already obtained a firm footing in market favour, a good deal of business taking place in the stocks. The business would be of greater extent were there larger supplies of the stocks to be obtained. Holders obviously

regard their investments as being good enough to keep, with the consequence that prospective buyers find themselves faced with difficulty in obtaining what they require. There is a fairly free market in the "C" stock. British Electric Traction deferred advanced to over 500, and at 485, to which it reacted, the price is 10 points higher on the week.

Central Electricity

The Central Electricity Board has applied to the Electricity Commissioners for a Special Order to authorise an increase of its borrowing powers. Announcement of this was sufficient to cause the price of the existing stocks to develop dullness. It was almost immediately explained, however, that the Central Electricity Board has no intention of asking for money in the immediate future, and does not anticipate offering any further stock for subscription during the current year. The Board, according to the official statement, in seeking the increase has in mind possible further expenditure on any new grid developments. The construction of the grid has now been completed, and the 2,500 miles in operation will suffice, with the necessary extensions, to carry electricity wholesale to every corner of Great Britain. The scheme, which has taken nearly six years to complete, has cost 27 millions sterling. The borrowing powers of the Central Electricity Board at present are 50 million pounds, and the Electricity Commissioners have already given consent to the issue of nearly 47 million pounds, of which the greater part has been absorbed by the public.

Electricity Supply Shares

The outstanding feature in the list of electricity supply companies is the way in which provincial shares are improving in value. This has been, however, so constant a movement for some time past that to label it a feature at this present moment is perhaps inappropriate, but the fact remains that an unusual number of rises have taken place, as reference to the price list will show. Scottish Power are up to the round £2. Electrical Distribution of Yorkshire show a gain of 3s. 3d. at 49s. 6d. Yorkshire Electrics are better at 45s., Northamptons at 52s. Bournemouth shares refused to be left out of the movement, and are 1s. 3d. up at 77s. 6d. The prices of the provincial shares have risen to levels at which, in a number of cases, they stand relatively higher, as regards yield on the money, than do even the shares of the London electricity supply group. The latter, where they move at all, add small fractions to their previous prices. Metropolitans at 51s. 3d. are ⅛ up. County of London at 54s. 6d. show a gain of 9d. Edmundson's ordinary strengthened to 35/-. West Gloucestershire is down a point at 63.

Preference Shares Advance

To the rises in Electric Supply Corporation shares there seems no end. The price at 76s. 3d. shows a further gain of 1s. 9d.; last week-end it touched 78s. 9d. A couple of months ago the shares were standing at 65s. Electric Finance & Securities, on the attention called to them a fortnight back, when shares were on offer at 63s. 9d., are up to 67s. 6d. Richmond (Surrey) ordinary shares are better at 53s. 6d., Llanelly & District keep very hard at 22s. 6d., and Hendon Electric at 52s. Five hundred Notting Hill Electric Light ordinary are offered at 40s. 6d., and 500 City of London ordinary at 34s. The yields, on the basis of the last-paid dividends, are £3 19s. 6d. and £4 2s. 3d. per cent respectively.

Preference shares in this market have a string of rises to their credit. Notting Hill preference at 13½ are 10s. up. Amongst preference shares not regularly quoted in our lists, advances have taken Scottish Power to 28s. 6d., Clyde Valley and Yorkshire Electric Power both to 30s., East African Power to 29s., Cornwall Power to 18s. 9d.

Electric Supply Corporation

For the rise in Electric Supply Corporation shares it is necessary to refer to the expectation that has been current for some time past of a possible bonus. What shape this will assume has been a matter for conjecture, but it may not be going beyond the bounds of likelihood to suggest that a new issue of shares may be made, either for nothing, or at some price which would afford a substantial profit to those who cared to sell when the allotments appeared. The prophet may venture to hint that the new issue will not be made until some time in the early spring of next year, and that when it comes the company will be in a sufficiently strong position to make it tolerably evident that the present-paid dividend of 11 per cent. will be maintained on the additional capital.

Cables and Wireless

Cables and Wireless issues are somewhat neglected. Prices have moved narrowly. The preference stock is easier at 82½. Globe Telegraph & Trust ordinary have come to market: the price at 11½ is 7s. 6d. down. Anglo-Americans retain their recent rises. American Telephone & Telegraph is unchanged at 142½. Internationals at 19¼ have further improved upon their gain of last week. The other dollar stocks have developed reaction, Brazilian Tractions going back to 15½, Shawinigans being 1 down at 19½.

American buying is held to be responsible for improvements in General Electric ordinary and Associated Electrical Industries. Telegraph Constructions are better at 23s. 9d. Ever Ready hardened to 28s. 3d. The iron and steel group is slightly easier; Babcock and Wilcox receded to 37s. 6d., Vickers to 8s. Nothing of fresh interest has transpired in the rubber share market.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1931.	1932.	Price, Sept. 5.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	+⅛	3 17 5
Brompton Ordinary	1	8½	7	33/-	—	4 4 10
Charing Cross Ordinary	1	8½	7	33/-	—	4 4 10
Chelsea	1	8½	7	32/6	—	4 6 2
City of London	1	10	10	33/9	—	4 3 0
Clyde Valley	1	7	7	37/6	—	3 14 8
County of London	1	10½	10½	54/6	—	3 17 1
Edmundson's 7% Pref.	1	7	7	32/-	—	4 7 6
Elec. Dis. Yorkshire	1	9	9	49/6	+3/3	3 12 8
Elec. Supply Corporation	1	11	11	76/3	+1/9	2 17 6
Kensington Ordinary	1	8	7	32/6	—	4 6 2
Lancs Light and Power	1	7	7	35/9	+9d.	3 18 5
London Electric	1	9	7	32/6	—	4 6 2
Metropolitan	1	10	10	51/3	+⅛	3 18 2
Midland Counties	1	7	7	35/9	+9d.	3 18 5
Mid. Elec. Power	1	8	8	40/-	+6d.	4 0 0
North Eastern Electric Ordinary	1	6	6	32/6	+6d.	3 13 10
Do. 7% Pref.	1	7	7	33/-	+6d.	4 4 10
Northampton	1	10	10	52/-	+9d.	3 17 0
Notting Hill 6% Pref.	10	6	6	13½	+½	4 12 4
North Met. Elec. 6% Pref.	1	6	6	29/6	—	4 1 4
St. James' and Pall Mall	1	8	7	33/-	—	4 4 10
Scottish Power	1	8	8	40/-	+1/9	4 0 0
South London	1	8½	7	33/-	—	4 4 10
Westminster Ordinary	1	8½	7	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/3	—	7 1 2
Yorkshire Elec.	1	8	8	45/-	+6d.	3 11 3

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	100	—	4 11 9
Do. 1951–73	„	4½	4½	107	—	4 4 1
Do. 1963–93	„	—	3½	92	—	3 16 1
London & Home Counties, 1955–75	„	4½	4½	107	—	4 4 1
London Passenger Transport, A	„	—	4½	115	+½	3 18 3
Do. do. B	„	—	5	119	—	4 4 0
Do. do. C	„	—	—	81	—	—

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	142½	—	6 6 4
Anglo-Am. Tel. Pref.	Stock	6	6	111½	—	5 7 7
Do. Def.	„	1½	1½	28	—	5 5 3
Cables & Wireless 5½% Pref.	„	2¾	2¾	82½	—1	3 6 10
Do. A 7½% Ord.	„	Nil	Nil	30	—	—
Do. B Ord.	„	Nil	Nil	14	—	—
Globe Tel. and T. Ord.	10	Nil	2½	11½	—½	2 3 6
Do. do. Pref.	10	6	6	12¾	—	4 17 0
Great Northern Tel.	10	20	20	31	—½	6 9 0
Marconi-Marine	1	10	7½	33/9	—	4 9 0
Oriental Telephone Ord.	1	12	12	2¾	—	*4 3 6

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	4/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/3	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	10½	—	—
British Electric Traction Df. Ord.	„	5	5	485	+10	—
Do. do. Pref. Ord.	„	8	8	142½	—	5 12 3
Brazil Traction	100	—	—	15½	—¾	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	100½	—	4 19 6
Mexico Trams, 5% Bonds	—	5	5	27½	—	18 3 8
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	55	—	9 1 10
Victoria Falls Ord.	1	15	20	98/9	+⅛	4 1 6
Yorkshire (West Riding)	1	Nil	Nil	11/6	+6d.	—

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	4	4	22/-	+9d.	3 12 9
Do. Pref.	1	8	8	30/9	—	5 4 2
Babcock & Wilcox	1	14	9	37/6	—9d.	4 16 0
British Aluminium Ord.	1	5	5	31/3	—	3 4 0
British Insulated Ord.	1	15	15	71/3	—	4 2 4
Brush Ord.	Stock	Nil	Nil	35	—	—
Callender's	1	15	15	3¾	—	4 16 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/-	22½	—	18/3	—	6 5 7
Do. 8% Pref.	1	8	8	28/9	—	5 11 4
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	91/3xd.	—	5 9 8
English Electric	1	Nil	Nil	10/-	—	—
Do. do. Pref.	1	Nil	Nil	15/-	—	—
Ever Ready	5/-	35	35	28/3	+6d.	6 4 0
Ferranti Pref.	1	7	7	25/9	—	5 8 9
G.E.C. Pref.	1	6½	6½	29/-	—	4 9 8
Do. Ord.	1	8	8	45/-	—	3 11 2
Henley's	1	30	30	6¾	—	4 14 4
Do. 4½% Pref.	5	4½	4½	5½xd.	—	4 5 9
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	5	5	22/-	—	4 11 0
Siemens Ord.	1	7½	6½	24/6	—	5 6 0
Telegraph Construction	£1	Nil	Nil	23/9	+1/6	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

31204. "Electric power transmission." Economic Transmission, Ltd., and A. M. Taylor. November 11th, 1931. (Cognate applications, 32342/31, 35239/31, 5323/32, 9479/32 and 15045/32). (396759.)

36007. "Electric discharge lamps." British Thomson-Houston Co., Ltd. December 31st, 1930. (396725.)

1932

273. "Electric lamps of the dry-battery type." F. J. Miller. January 5th, 1932. (396692.)

430. "Electrolytic treatment of aluminium or its alloys." E. Windsor-Bowen. January 6th, 1932. (396743.)

662. "Electric lampholders." J. A. Crabtree. January 9th, 1932. (396727.)

680. "Insulated electrical conductors." W. G. M. Robinson, F. L. Witcomb, and India Rubber, Gutta Percha, and Telegraph Works Co., Ltd. January 9th, 1932. (396784.)

3104. "Electric and engine-electric traction." Sir W. G. Armstrong, Whitworth and Co. (Engineers), Ltd., and C. M. Beckett. February 2nd, 1932. (396764.)

3388. "Suspension insulators for overhead electric transmission lines and the like." J. M. Wallace. February 4th, 1932. (396700.)

3453. "Variable electric condensers." Kolster-Brandes, Ltd., and P. A. Tiller. February 5th, 1932. (396703.)

3454. "Automatic or semi-automatic telephone systems." Standard Telephones and Cables, Ltd., E. P. G. Wright, G. C. Hartley and M. S. Snell. February 5th, 1932. (396704.)

3518. "Microphone amplifiers." Electrical Research Products, Inc. February 27th, 1931. (396707.)

3560. "Terminating-circuits for two-way electrical signalling systems." Electrical Research Products, Inc. February 28th, 1931. (396709.)

3698. "Arrangement for the transmission of call and selector impulses over telephone lines." Telefonaktiebolaget L.M. Ericsson. February 11th, 1931. (396719.)

3732. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd., C. E. Beale and R. Taylor. February 8th, 1932. (396720.)

3874. "Electromagnetic switching-devices for use in telephone or like systems." Siemens and Halske Akt.-Ges. February 25th, 1931. (396738.)

3876. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd., and C. R. Woodland. February 9th, 1932. (396739.)

3879. "Secondary electric cells." L. A. Levy and Almeida Accumulators, Ltd. February 9th, 1932. (396751.)

3912. "Means for mounting incandescent electric lamps and reflectors for same." W. L. Turpie. February 10th, 1932. (396752.)

3968. "Electrically controlled clock systems." R. F. A. Housman. February 10th, 1932. (396793.)

4001. "Method and apparatus for establishing a calling or other circuit in wireless receiving stations." C. L. P. Dean and C. W. H. Begbie. February 10th, 1932. (396753.)

4026. "Radio receivers." Standard Telephones & Cables, Ltd., and R. M. Barnard. February 11th, 1932. (396772.)

4132. "Automatic alarm devices." Marconi's Wireless Telegraph Co., Ltd., and S. C. Hills. February 11th, 1932. (396776.)

4219. "Electron-discharge device." Arcturus Radio Tube Co. February 12th, 1931. (396799.)

4250. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and J. C. Read. February 12th, 1932. (396802.)

4264. "X-ray installations for making radioscopes and radiographs." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 14th, 1931. (396803.)

4727. "Thermionic electrometers." C. Morton. February 17th, 1932. (396817.)

4748. "Impulse senders for use in telephone or like systems." Siemens & Halske Akt.-Ges. February 20th, 1931. (396819.)

4825. "Electric wave signalling apparatus." General Electric Co., Ltd., and D. H. Hughes. February 18th, 1932. (396822.)

4851. "Arrangements for charging electric secondary batteries." Siemens Bros. & Co., Ltd., D. A. Christian and H. S. Double. February 18th, 1932. (396823.)

5260. "Electron-discharge tubes used for the recording of sounds." Fidelity Films, Ltd., and F. K. Crowther. February 22nd, 1932. (Addition to 364146.) (396830.)

5585. "Connection system for cathode ray oscillographs in conjunction with special receivers." M. Von Ardenne. February 25th, 1932. (396836.)

7342. "Electric protective systems." British Thomson-Houston Co., Ltd. March 16th, 1931. (396853.)

8324. "Electromotors." Siemens Bros. & Co., Ltd., and H. E. Humphries. March 21st, 1932. (396855.)

8878. "Methods of making electric insulating materials." International General Electric Co., Inc. March 25th, 1931. (396858.)

10841. "Electric circuit interrupters." H. Pearce, A. N. Haworth, and Associated Electrical Industries, Ltd. April 15th, 1932. (396871.)

11294. "Arc lamps for photographic and like purposes." B. J. Hall. April 20th, 1932. (396876.)

11336. "Electric variable resistances." British Thomson-Houston Co., Ltd., and D. S. Horne. April 20th, 1932. (396877.)

11475. "Arrangement of a sealing chamber with cut-outs and other devices for use with electric cables." Callender's Cable & Construction Co., Ltd., and A. E. Wilson. April 21st, 1932. (396878.)

12118. "Protective devices for electric condensers." British Thomson-Houston Co., Ltd. April 27th, 1931. (Addition to 373047.) (396883.)

13315. "Intercommunication telephone systems." Ericsson Telephones, Ltd., and W. E. Hunt. May 9th, 1932. (396887.)

13854. "Manufacture of electrical conductors." Naamlooze Vennootschap Hollandsche Draad—En Kabelfabriek September 16th, 1931. (396891.)

14772. "Electric cables." Pirelli-General Cable Works, Ltd., and J. R. Harding. May 24th, 1932. (396898.)

14924. "Eliminating interference in radio reception." P. L. V. Lambert. May 26th, 1932. (396899.)

15843. "Electrodes for discharge tubes." B. Erber and A. Schwitzer (trading as G. Ganz & Co.). July 8th, 1931. (Addition to 371419.) (396905.)

16238. "Electric incandescent lamps." A. E. Chapman. June 8th, 1932. (396909.)

17761. "Alternating current watt-hour electricity meters." G. Wall and Associated Electrical Industries, Ltd. June 23rd, 1932. (396917.)

17906. "Electric fans." P. Cote. June 24th, 1932. (396920.)

19011. "Loud-speakers." General Electric Co., Ltd., and E. M. Eden. July 5th, 1932. (396925.)

19835. "Methods of operating discharge devices of the dependent arc type." International General Electric Co., Inc. (Allgemeine Elektricitäts Ges.). July 13th, 1932. (396928.)

20068. "Electric discharge tubes." C. H. F. Muller Akt-Ges. July 22nd, 1931. (396930.)

26718. "Frequency transformation of three-phase current." Akt.-Ges. Brown, Boveri et Cie. September 25th, 1931. (396954.)

31842. "Electromagnetically operated valves for internal combustion engines." H. E. Kennedy and B. Walker. November 10th, 1932. (396972.)

33129. "Arrangement for supporting the connecting wires of electric irons, cooking apparatus and the like." E. A. Waldau. November 7th, 1932. (396984.)

33553. "Finely adjustable wire-wound high resistances." J. Hubl and E. Klein. November 26th, 1931. (396986.)

34595. "Loud-speakers and other apparatus for interconverting electrical and acoustic vibrations." J. H. W. Lewis. December 6th, 1932. (396990.)

35078. "Switch device for adaptors for electric lamps." P. Hochkopper, O. Winkel and E. Assman (trading as P. Hochkopper & Co.). December 12th, 1931. (396993.)

35299. "Electric accumulators." Chloride Electrical Storage Co., Ltd., and J. A. Hamilton. December 13th, 1932. (396994.)

35694. "Electron-discharge devices." Igranic Electric Co., Ltd. December 19th, 1931. (396998.)

35754. "Liquid break electric circuit breakers." International General Electric Co., Inc. December 16th, 1931. (396999.)

35982. "Means for regulating the voltage supplied to lamps, motors or other current-consuming apparatus which are supplied with alternating or pulsating direct current." A. Iseus and O. H. T. Olsson. December 1st, 1932. (397000.)

36662. "Controllers for electric motors." Igranic Electric Co., Ltd. January 2nd, 1932. (397004.)

36773. "Electric lamps." General Electric Co., Ltd. December 29th, 1931. (397006.)

36782. "Thermionic-valve oscillation generators." Telefunken Ges. für Drahtlose Telegraphie. December 29, 1931. (397007.)

1933

2029. "Electrically operated weighing machines." British Thomson-Houston Co., Ltd. January 21st, 1932. (397020.)

2555. "Electrical insulation of wires." Steatit-Magnesia Akt.-Ges. January 29th, 1932. (397021.)

3905. "Switch mechanism for manually controlled electrical boring machines." Siemens-Schuckertwerke Akt.-Ges. August 31st, 1932. (397028.)

5070. "Electric discharge devices." General Electric Co., Ltd. March 4th, 1932. (397032.)

5232. "Electrically insulating bushings." Westinghouse Electric & Manufacturing Co. March 19th, 1932. (397033.)

5699. "High-frequency electrical oscillation generators." Compagnie Générale de Télégraphie sans Fil. March 31st, 1932. (397036.)

5916. "Electric power distribution systems." British Thomson-Houston Co., Ltd. February 27th, 1932. (397040.)

6909. "Method of manufacturing zinc battery cans." Metallges Akt.-Ges. June 13th, 1932. (397044.)

8505. "Means for running variable-speed dynamo-electric generators in parallel with a constant voltage source." English Electric Co., Ltd., and J. C. Wilson. March 21st, 1933. (397056.)

9993. "Indicating devices suitable for use in connection with tuning and other control means for radio receivers." Marconi's Wireless Telegraph Co., Ltd. April 2nd, 1932. (397067.)

10134. "Electric batteries." Ever Ready Co. (Great Britain, Ltd.). April 4th, 1932. (397068.)

11344. "Electric luminous discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 18th, 1932. (397074.)

11613. "Electrostatic voltmeters." Hartmann & Braun Akt.-Ges. June 7, 1932. (397075.)

12070. "Thermionic amplifiers." British Thomson-Houston Co., Ltd. April 28th, 1932. (397076.)

13627. "Electric cables for use for conveying radio and other very high-frequency energy." Telefunken Ges. für Drahtlose Telegraphie. May 10th, 1932. (397081.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 30th :—

Glorex. No. 543271. Class 8. Electric accumulators and batteries (not for medical purposes).—British G.W.Z. Battery Co., Ltd., 205-207, Bedford Avenue, Trading Estate, Slough, Bucks.

Decca. No. 542022. Class 13. Incandescent electric lamps.—Decca Record Co., Ltd., Burlington Road, New Malden, Surrey.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Addlestone (SURREY).—Church of St. Augustine; Rev. H. E. Paterson, vicar.

Alloa.—Houses (£14,000); burgh surveyor.

Ashby-de-la-Zouch.—Houses (30), Overseal and Woodville; Goddard & Wain, architects, Station Chambers, High Street, Coalville.

Ayr.—Racing track for Ayr Greyhound Stadium Co.; secretary.

Benfleet (ESSEX).—Houses (120), shops (11), and dance hall (£2,200), Parkfields, Thundersley; D. & S. Housing Co., Bloomfield Street, London, E.C.

Bingley.—Houses (96), Gawthorne Hall Estate; Frank Scott. Estate development, Primrose Hill; J. W. & F. Derrick.

Birmingham.—Factory at Roland Watson Gun Works, 17, Whittall Street (£10,000); W. J. Whittall & Sons, builders, Lancaster Street. Rebuilding Peacock Inn, Darwin Street, for Mitchells & Butlers, Ltd., Smethwick (£8,000); G. Webb & Sons, builders, Soho Hill, Handsworth.

Blofield.—Houses (284), Mousehold Farm, Great Plumstead; Percy Howes & Co., Norwich.

Bracknel (BERKS).—Post office; Office of Works, King Charles Street, S.W.1.

Broughton.—Houses (34), Broughton; Wrexham R.D.C. surveyor.

Burnley.—Houses (66), Casterton Avenue; borough surveyor. Employment exchange; H.M. Office of Works, King Charles Street, S.W.1.

Cambridge.—Houses (68), Histon Road (£19,788); John Brignell. Houses (47), Cherryhinton Road; H. D. Ridgeon. Extensions, School of Botany, Tennis Court Road; Chancellor, University. Alterations and additions, Mallory Court, Magdalene Street; Magdalene College Fellows. Alterations and additions, Round Church Street; Cambridge Union Society. Additions to premises, Trumpington Street; Governors, Addenbrooke's Hospital. Rebuilding Three Tuns Hotel, Castle Street (£4,000); G. F. Dale. Additions to theatre, St. Andrews Street; New Theatre (Cambridge), Ltd. Reconstruction of business stores; Sidney Street and Hobson Street, for Miller & Sons, Ltd.; G. Miller.

Chesterfield.—Extensions, including shopping arcade, for J. K. Swallow & Sons, Knifesmithgate and Packers' Row.

Clacton-on-Sea.—Extensions, Pier entrance, with electrical work; E. Kingsman.

Clydebank.—Cement works, Rothesay Dock; F. L. Smith, Victoria Street, London.

Colwyn Bay.—Houses (39), Penrhyn Avenue; Wooler & Sons.

Cricklewood.—Houses (60), Edgware Road; Wm. Thorpe.

Cullercoats (NORTHUMBERLAND).—Rebuilding Spring Gardens Inn for Newcastle Breweries, Ltd. (£5,000); J. and W. Lowry, builders, 50, Corporation Street, Newcastle.

Cupar (FIFE).—Additions and alterations, Fife and Kinross District Asylum (electrical work); A. D. Haxton, architect, Commercial Road, Leven.

Denny (STIRLINGSHIRE).—R.C. schools (£14,000); Rev. F. O'Brien, St. Alexander's Church.

Derbyshire.—Engineering services for central station, Mickleover Mental Hospital; J. Roger Preston, consulting engineer, 10, Talbot Mansions, Museum Street, London, W.C.

Didcot.—Business stores, Broadway; Oxford Co-operative Society; secretary. Houses (80), Abingdon Road; E. K. Ellis, Harwell.

Dover.—Extensions, covered market and museum; W. B. Smith, borough engineer.

Droitwich.—Reconstruction of Playhouse for T. McDermott (£5,000); J. & A. Brazier & Co., builders, Worcester Road, Bromsgrove. Extensions, Worcestershire Brine Baths Hotel; T. F. Culley, manager.

Dundee.—Alterations, head offices of Dundee Eastern Co-operative Society, Ltd., Seagate; Gordon & Scrymgeour, architects, 7, Ward Road. Stores, Candle Lane, for James Watson Co., Ltd.; Johnston & Baxter, architects, 114, Seagate.

Eastbourne.—Houses (54), Churchdale Road; E. Moss, Ltd., Cricklewood.

East Sheen.—Development of Wilderness and Deanhill Estates; Mr. Mousley.

Edinburgh.—Houses (53); J. Millar, architect, Gayfield Place. Houses (85), Tillyside; Hepburn Bros.

Fleetwood.—Houses (100), Flakefleet Estate; U.D.C. surveyor.

Glasgow.—Extensions, St. Charles School (£30,000); education director and trade contractors. Church school (300 places), Shawpark Street, Maryhill. Modernisation of hotel for R. B. More (new lift); J. T. Thomson, architect, 212, Bath Street.

Golders Green.—Library (£10,300); Hendon borough engineer.

Handsworth (BIRMINGHAM).—Factory, Hollyhead Road, for E. Rudd & Co. (£6,000); Maddocks & Walford, builders, Tyburn Road, Erdington. Business premises at rear of Stafford House, Hollyhead Road (£5,000); Trow & Sons, builders, 97, Antrobus Road, Birmingham.

Hendon.—Houses (56), Rushgrove Avenue Estate; Done Hunter & Co. Flats (80), Brent Street; Tatchell & Wilson. Flats (24), Watford By-pass; G. A. Oram & Son. Infants' school, Sunningfields Road (£8,356); H. H. & F. Roll, Ltd. Additions, Cottage Hospital; W. Marchment. Synagogue, Raleigh Close; Jewish trustees.

Heston.—Development of 22 acres, Woodfield Road; W. J. Harris, 302, Bath Road, Isleworth.

Hetton (Co. DURHAM).—Houses (32), Pemberton Street; U.D.C. surveyor.

Hockley (BIRMINGHAM).—Factory, Branston Street, for Joseph Lucas, Ltd. (£20,000); Whittall & Son, builders, Lancaster Street.

Hornchurch.—Houses (43), Southend Road; Baker, Hammond & Laver. Shops, Rainham Road and South End Road; J. S. Broadbent, architect.

Hove.—Grammar school extensions; Denman & Son, architects, 27, Queen's Road, Brighton.

Hyde.—Extensions, Rexine works, Muslin Street; Imperial Chemical Industries (Rexine), Ltd.

Irlam (LANCS).—Houses (32), Liverpool Road; G. F. Norris. Houses (35), Irlam Moss; J. Johnson.

Isleworth.—Houses (44), Pears Road; G. Nicholls, The Broadway, Stanmore.

Kendal.—Houses (86), Greengate Estate; F. W. Oxberry, borough surveyor.

Knaresborough.—Land development, off Aspin Lane; C. F. Exley. Market hall; U.D.C. surveyor.

Lanarkshire.—Annexe, Greenfield Primary School, Burnbank, Hamilton (electrical work); J. Stewart, county architect, 20, Albert Street, Motherwell.

Liverpool.—News cinema, Williamson Street and Church Street (£10,000); A. E. Shennan, architect, 14, North John Street.

Manchester.—Houses (708) and flats (36), Brownley Green (£257,364); city architect.

Margate.—Business stores for the Co-operative Society; secretary.

Mill Hill.—Houses, off Devonshire Road (36), and Abercorn Hill (19); Mill Hill Homesteads, Ltd.

Montgomeryshire.—Extensions, intermediate school, Llanfair Caereinion; L. Phillips, director of education, Newtown.

Newcastle-on-Tyne.—Extensions to Elswick Lead Works; Cackett, Burns, Dick & MacKellar, architects, 21, Ellison Place, Newcastle.

Northampton.—Houses (104), Abingdon Estate (£29,183); Bainbridge (Builders), Ltd., Doncaster.

Nuneaton.—Development, Mount Pleasant Farm Estate; Terrell Bros.

Oxford.—Houses (538); city estates surveyor.

Peterborough.—Houses (60); G. A. Campion, builder.

Rainford (LANCS).—Houses (38), Mill Lane; Rainford Potteries Co.

Raleigh.—Church and Sunday school, Eastwood Road; Wesleyan trustees. School and church, London Hill; Catholic trustees. School, The Weir; Essex E.C.

Rochdale.—Tuberculosis block at Springfield; R. & T. Howarth, builders, Crossfield Works.

Rugby.—Development of Bawnmore Estate and conversion of Bawnmore House into flats; W. W. Heap, builders, Dunchurch.

St. Albans.—Postal sorting office, Beaconsfield Road; H.M. Office of Works, King Charles Street, S.W.1.

Shoreham.—Houses (62), Connaught Avenue; E. W. Coleman. School, Middle Road; West Sussex Education Committee.

Slough.—Two factories, Buckingham Avenue; Slough Estates, Ltd. Factory, St. Mary's Road, Langley; J. L. Thompson. Boiler house, Fairlie Road; Mars Confections, Ltd. Three shops and flats, Meadfield Road, Langley; A. T. Ricketts.

Somerset.—Elementary school, Timsbury (£13,275), and secondary school, Weston-super-Mare (£51,450); County E.C.

Southampton.—Development, Bargate site; Mr. Cart de Lafontaine. Development, off Shanklyn Road; Atherley Estate trustees. Houses (40), Ashby Road, &c.; Hamtun Building Co., Ltd. Houses (30), off Coxford Road, for T. Clark & Son, Ltd.; W. H. Masters. Houses (34), Pirrie Close; A. E. Knight. Rebuilding, 122-6, St. Mary's Road; Southampton Co-operative Society, Ltd. Parish hall, Weston Lane; Holy Trinity trustees. Workshop additions, Hazel Road; Supermarine Aviation Works (Vickers), Ltd. New premises, Girls' Grammar School, for E.C. Bank, Canal Walk; Lloyds Bank, Ltd.

Stafford.—Annexes, Mental Hospital; K. L. Murray, architect, County Buildings.

Stanley (Co. DURHAM).—Post offices, Clifford Road; H.M. Office of Works, King Charles Street, S.W.1.

Stretford.—Infants' school, Moss Park; P. Howard, architect, 88, Mosley Street, Manchester.

Taunton.—Houses (68), Galmington Lane site; J. F. Shellard, borough engineer.

Tamworth.—Boiler house at institution; K. L. Murray, county architect, Stafford.

Trowbridge.—Library premises; T. Walker, county architect.

Tyldesley.—Houses (80), Mossley Common site, Boothstown, for U.D.C.; R. & W. Gregson, builders, Milk Street.

Urmston.—Garage extensions, Higher Road, Urmston, for North Western Road Car Co., Ltd.; Thomas Warrington, Ltd., contractors, 51, Bennett Street, Hyde.

Walkden.—Grocery branch and houses (14), Boothstown district, for Walkden Provident Industrial Co-operative Society, Ltd.; G. & J. Seddon, Ltd., builders, 5, Manchester Road, Little Hulton, Bolton.

Wallingford.—Housing scheme, Wallingford and Wantage; Structural Contractors, Ltd., 36, Victoria Street, S.W.1.

Wallsend.—Cinema (800 seats), Benton Way; W. Riddle, architect, 53, Denham Terrace.

Walsall.—Works (electrically equipped), Goscoat Lane; C. V. Longmore & Co., Ltd.

Walthamstow.—School, Thorpe Hall (£10,985); H. C. Horswill, Ltd., Forest Gate.

Wednesfield.—Re-erection of works (£10,000); Wolverhampton Metal Co., Ltd.

Welling (KENT).—Shops (30), High Street; J. Stevens, builder.

West Bromwich.—Houses (48), Walsall Road, for Jones and Croxford; A. Smith, builders, Lichfield Road, Bloxwich. Joseph Edward Cox School, Friary Estate; A. O. Chatterly, architect, 5, Newhall Street, Birmingham.

Weymouth.—Masonic headquarters, Westham, for United Services Lodge; J. R. Truscott, secretary.

Wigan.—Market extensions; borough engineer.

Wimborne & Cranborne.—Houses (32); R.D.C. surveyor.

Wokingham.—Development of Maiden Erlegh Estate; F. Scrivener & Co.

Worcester.—Tunnell Hill School; A. Parker, architect, The Cross.

Yeovil.—Rebuilding, Halfway House Inn, Main Road; Joseph Brutton & Sons.